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In this paper we document significantly steeper declines in nondurable expenditures in the UK compared to the US, in spite of income paths being similar. We explore several possible causes, including different employment paths, housing ownership and expenses, levels and paths of health status, and out-of -pocket medical expenditures. Among all the potential explanations considered, we find that those to do with healthcare – differences in levels, age paths, and uncertainty in medical expenses – are the main factor accounting for the steeper declines in nondurable expenses in the UK compared to the US. (*JEL* D10, D11, D12, D14, D91)

Research on life cycle consumption patterns has typically concentrated on working ages with an emphasis on expected paths in labor income, economic wage shocks, and retirement; see for example the *Review of Economic Dynamics* special issue on micro facts (Violante 2010). However, this leaves out an important and growing span of life during the post-retirement years where other factors such as health, mortality, health expenses and shifts in housing expenditures and recreation may play a more central role. Moreover, these are areas where there are large cross-country institutional differences, for example in housing markets and in whether medical care is privately or government financed, that may have important implications for patterns of nondurable consumption at older ages.

In this paper we show that in the UK average nondurable expenditure between the ages of 45 and 75 falls by around 3 percent each year. This compares to just one percent for the United States. To illustrate, the first panel of Figure 1 plots nondurable expenditures in the UK and US by age averaged across birth cohorts. It's clear that spending remains roughly constant after age 50 in the US while it falls much more rapidly in the UK.

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What can explain a difference of this magnitude? An obvious starting point is to examine age paths of income to access the extent to which consumption expenditures are tracking age paths in household income. But the second panel in Figure 1, which plots cohort averaged paths of household income at older ages in the two countries, demonstrates that income declines at very similar rates at older ages in the two countries so that this seems unlikely to be the major reason. In this paper we investigate other possible reasons that may explain the dramatically different patterns of nondurable consumption of older ages in the two countries by investigating differences in both inter and intra-temporal consumption for households around and beyond retirement age.

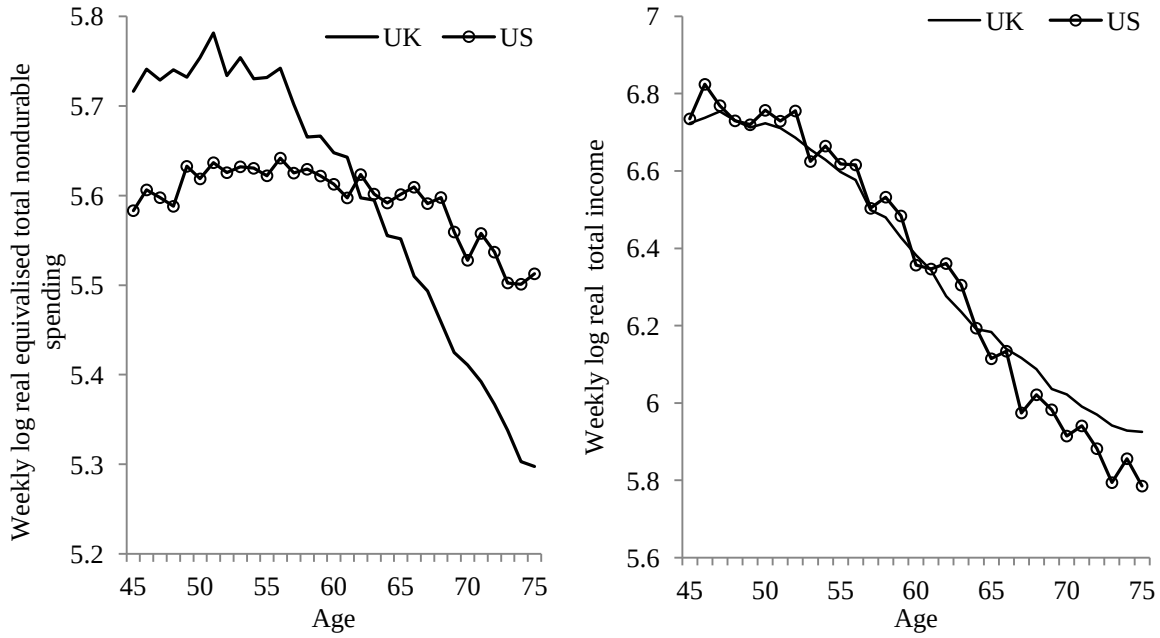


Figure 1. Nondurable Spending and Incomes in the US and UK by Age, 1984-2009

Note: Authors' calculations using BLS Consumer Expenditure Survey 1984-2009 and ONS Living Costs and Food Survey 1984-2009. Values are in US$ (2010).

The set of factors that we explore in this paper include: differential cohort effects in the two countries that may distort average life-cycle age profiles, differences in the timing of retirement in the presence of separabilities with employment, differential paths of housing expenditures possibly driven by institutional differences in housing markets between countries, level and path differences in health status and mortality, and finally levels and volatility of medical spending in the US as deteriorating health with age leads to higher spending there while this is not true in the UK because of the National Health Service (NHS).

Our strategy in this paper is to first quantify the cross-country differences in the three potential factors – employment, housing status and health – and look for any immediate differences that might explain what the differential consumption paths observed in Figure 1. We find, however, that most of these variables evolve in a similar way in both countries although there are some notable differences, for example in tenure status. But even in the absence of differences in profiles these three factors might play a role in explaining the different shape of spending profiles if there are differences in the nature of non-separabilities between these variables and consumption expenditures across the two countries. We thus move on to look for evidence of such non-separabilities by examining their effect on within-period budget allocations in a simple demand system estimated in each of the two countries. We find evidence that the relationship between health expenditures and mortality and employment is much stronger in the US, suggesting that a model of non-durable non-medical spending paths might display more similarities across countries. We therefore move on to consider inter-temporal profiles and non-separabilities through estimating a model of consumption growth that conditions on changes in employment, housing and health. While we find that removing medical expenditures accounts for just over a quarter of the difference between the two counties, a substantial gap remains that does not disappear once differences in health, housing and employment are controlled for. Finally, within this intertemporal framework we discuss the potential size of differences in precautionary motives arising from greater uncertainty over future out-of-pocket medical expenses in the US and the effects that this might have on non-durable non-medical spending profiles. These plausibly explain the remainder of the difference between the countries.

The rest of the paper is organized as follows. In the next section we describe in more detail the essential features of the data we assemble to look at these issues and document cohort specific paths of nondurable spending and household income for both countries. We then move on to look at various potential explanations for the cross-country differences in turn – Section II provides a description for cohort specific age paths in employment in the two countries and discusses their implications for consumption profiles, Section III provides a parallel treatment for housing by describing age paths of housing ownership and Section IV focuses on levels and paths of health status and differential levels and age patterns of medical expenditures. With this in place, we move on to estimate within-period and intertemporal models of non-durable spending patterns in each country that incorporate these factors in order to explore their role. Section V contains within-period demand models for the various

sub-components of total nondurable expenditure conditioning on factors just discussed. Section VI then presents results obtained from an inter-temporal model of growth rates in total nondurable expenditures for each country to identify factors that may account for different shaped consumption paths at older ages. The final section highlights our major conclusions.

I. The Life-Cycle Pattern of Consumption and Income

We use two repeated cross-sectional surveys widely viewed as containing the highest quality measurement of household expenditure and its components in each country – the Consumer Expenditure Survey in the US and the Living Costs and Food Survey in the UK. While these surveys do not cover the same individuals for long periods of time, as described below we will organize the data to create a pseudo-panel and track cohort consumption behavior by age over time. This also allows us to merge in information from other surveys at the cohort-year level where necessary.

The LCFS is an annual cross-sectional survey that has been running in one form or another since 1961. The LCFS, formerly known as the Family Expenditure Survey, is conducted by the Office for National Statistics (ONS), the UK's national statistical agency and has been the basis of a number of studies of intra- and inter-temporal spending patterns. Currently it interviews around 6,000 households throughout the UK and continuously throughout the year. The survey begins with an interview with questions about demographic characteristics, income, large purchases over the last year and regular expenditures (such as magazine subscriptions, internet subscription costs and so on). Each household member over 16 then records all spending in a diary over the next two weeks.

For the US we make use of the Consumer Expenditure survey (CEX). This survey has carried out by the Bureau of Labor Statistics (BLS) on a continuous basis since 1980. For some quarters prior to 1984, the survey only covered households living in urban areas. The CEX includes two separate surveys, a diary survey which works much like the LCFS, and an interview survey, where households are asked to recall their spending on a range of spending categories over the previous three months. The interview survey is also a short panel, as the same households are interviewed on up to 5 occasions. The first of these interviews collects some basic data on family characteristics. Each subsequent interview updates this information and asks questions concerning household spending over the previous 3 months. Information on incomes and labor force participation are however only collected in the 2^{nd} and 5^{th} interviews (except for new household members and members who have newly started work),

meaning that income and spending data for the 3rd and 4th interviews need not cover the same time periods. In this paper we only make use of the interview survey. Around 5-8000 households are interviewed in each quarter.

In both the UK and US surveys, spending data are provided for hundreds of highly disaggregated individual product codes. We allocate these goods into 8 broader categories that are defined so as to be consistent across the two countries: food in, food out, other nondurables, medical, housing related, recreation and transport and durables. Some examples of what are included in these categories are given in Table 1. We do not include rental payments or mortgage interest in any of these definitions as we do not observe the "shadow price" of owned housing in the LCFS, nor can we estimate it easily (The CEX does include an self-reported imputed rental costs for owned properties). We define total nondurable expenditures to include all rows in Table 1 with the exception of the final row measuring durable spending.

Table 1. Spending Categories

Food in	Food at home
Food out	Food in restaurants, school dinners, and catering.
Other nondurables	Alcohol, tobacco, clothes, books, tobacco, child care, pet goods and services.
Medical	Health insurance premia, fees for services from health professionals, drugs, medical equipment, care in nursing homes and care of invalids.
Housing related	Electricity, gas and water bills, domestic services , repairs, and building insurance.
Recreation	Sporting goods, musical instruments, CDs, entertainment, and holidays
Transport	Motoring costs, petrol, fares for public transport.
Durables	Vehicles, white goods, black goods etc.

Household income data are derived from the same surveys and cohort age profiles obtained in the same manner. Household income is defined comprehensively to include all sources of income for the head of household and spouse/partner. We make use of net incomes, deflated using the Consumer Price Index in the US and the Retail Price Index in the

UK. All incomes are converted into dollars using PPP exchange rates from the OECD. These surveys also contain measures of standard definitions of labor force participation

In both datasets we restrict out attention to households aged 45-75. In the CEX we only use data from the first expenditure interview for two reasons: firstly, as this is one of the two interviews in which income and employment questions are asked, and secondly, so there will be no overlap in the household composition of current and lagged variables for our inter-temporal estimates. Were this not the case, then the presence of household fixed effects would mean that measurement error in cohort consumption growth had a MA(1) structure (with a coefficient of -1) – (Attanasio and Weber, 1994). For example, we could end up in a case where a high spending household observed in period t would give us positive measurement error in consumption growth from *t-1* to *t* and negative measurement error in consumption growth from *t* to *t+1*: introducing a spurious correlation between current growth and lagged growth in consumption (rendering lagged variables invalid as instruments).

To control for measurement error and impacts of extreme values on life-cycle paths, we trim households in the top or bottom percentile of distribution of income and expenditure. In the CEX we take data from 1984 (so as to consistently include a nationwide sample) until 2009. For the LCFS we take data from 1978 until 2009. In both cases we stop in 2009 as we do not have mortality data for either country after this date. Figure 2 plots cohort age profiles of log total nondurable spending in the two countries while Figure 3 provides a parallel plot for log total household income. Due to limited sample sizes for individual birth year cohorts we pool birth cohorts into five year groups starting with those born in 1908-1912 and ending with those born between 1943 and 1947. Nondurable expenditures and income are defined on a weekly per-capita basis in 2010 dollars.

While there is clear evidence of cohort effects in consumption and income in Figures 2 and 3 in both countries with more recent cohorts having higher levels of both consumption and income, it is also evident that these cohort effects by themselves cannot account for much of the main puzzle with which we motivated this paper—the relatively flat age pattern of non-durable consumption at older ages in the United States compared to the much more steeply declining age declines in the UK.

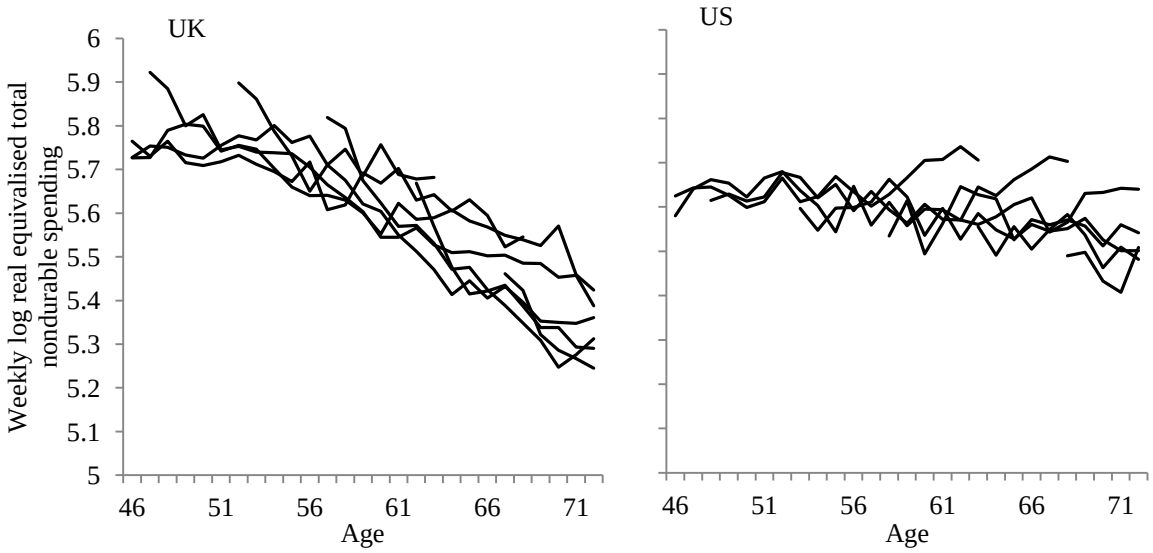


Figure 2. Nondurable Spending by Cohort and Age

Note: Data from LCFS in the UK and CEX for the US. Each line represents average log nondurable expenditures at each age for 5- year birth cohorts over the periods they are observed between ages 45 and 75 over the period 1984-2009. Values are in US$ (2010).

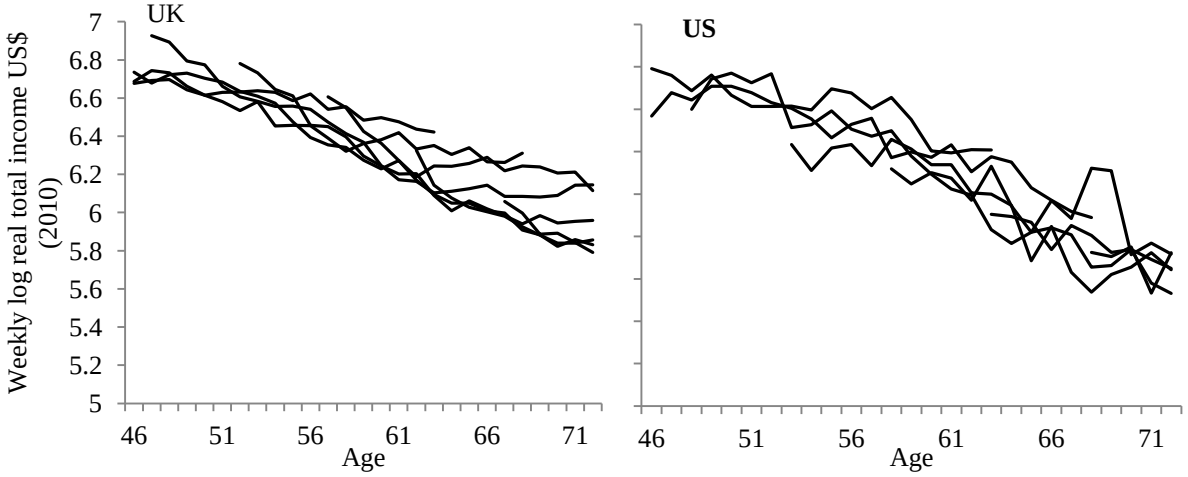


Figure 3: Log Household Income by Cohort and Age

Note: Data from LCFS in the UK and CEX for the US. Each line represents average log incomes at each age for 5- year birth cohorts over the periods they are observed between ages 45 and 75 over the period 1984-2009. Values are in US$ (2010).

II. Differences in Employment and Retirement

One dimension of labor force behavior at older ages that has been studied in the context of consumption age profiles involves the impact of retirement on levels and time paths of consumption. If preferences over employment and consumption are not separable or individuals do not fully anticipate income reductions coincident with labor market retirement, consumption levels and paths may not be independent of the retirement decision (Banks et al. 1998). This could partially explain cross-country differences if there are differences in non-separabilities between labor supply and consumption in the two countries, or if declines in employment were more rapid in one country than another (or both).

We illustrate age patterns of labor force participation by age in Figure 4 for men in both countries. Male age patterns of employment is clear with steady declines in participation from almost ninety percent to relatively small rates of participation by the mid- sixties.

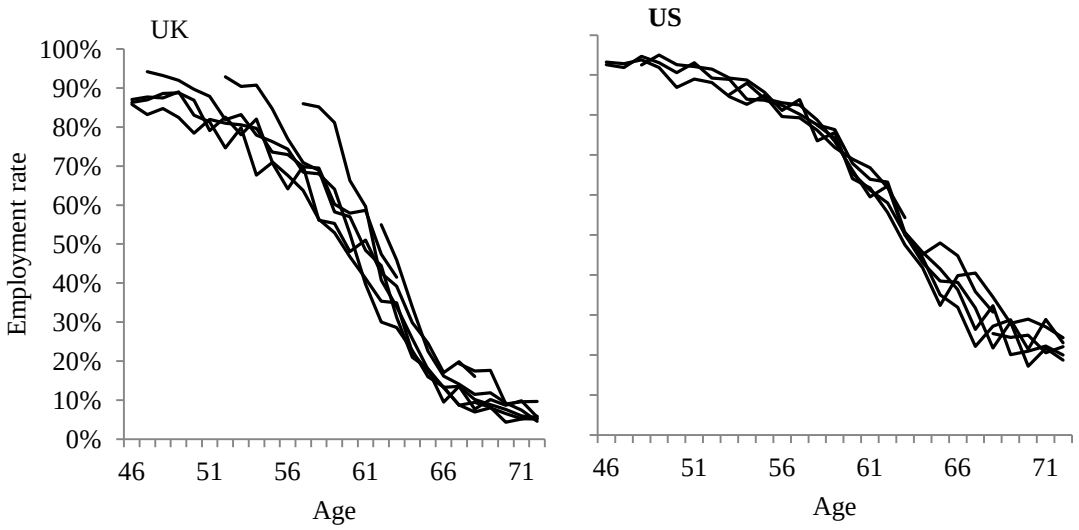


Figure 4. Employment Rates: Men by Cohort and Age

Note: Data from LCFS in the UK and CEX for the US. Each line represents average employment rates for men at each age for 5- year birth cohorts over the periods they are observed between ages 45 and 75 over the period 1984-2009.

These declines in male employment by age are somewhat more rapid in the UK compared to the United States but the main message would be that they are quite similar. Age paths for women (not shown) also display the same pattern of rapid declining employment rates with age as women exit the labor force in both countries.

In the absence of non-separabilities in employment and consumption, differences in paths of employment at older ages in the two countries do not seem large enough to be the major explanation for large differences in consumption profiles. Non-separabilities can be important and we will examine the role of non-separabilities between labor supply and consumption in explaining the cross-country difference in consumption profiles in more detail in Sections V and VI below.

III. Housing Ownership and Downsizing

Housing related decisions and expenditures represent another spending category in which there are important institutional differences between the countries that may affect levels and age paths of expenditures at older ages. We have provided evidence in other work that there exists far less geographical mobility in Britain compared to the United States and more downsizing in the US compared to the UK as a meaningful fraction of older Americans move to smaller homes (i.e. fewer rooms) with little evidence of such downsizing in Britain (Banks et al. 2010; 2012). While this lower rate of British mobility was characteristic of both owners and renters, the differential was particularly high among renters indicating that higher transactions costs associated with owning are unlikely to be a full explanation.

For British households over age 50, the probability of being a homeowner is about thirteen percentage points lower than for an American household, a deficit mostly offset by a higher probability of renting in highly subsidized 'social' housing. The major secular changes in housing tenure at older ages have decidedly taken place in the UK and not the US. The fraction of older British people owning their own home increased by almost thirty percentage points (from less than half to over 80 percent) from the 1908-12 cohort to the 1943-47 cohort. In contrast over the same set of birth cohorts and age groups, the fraction of older American households who were home owners has remained relatively stable at a bit over 80 percent.

The reason for this secular change in home ownership rates for older British households is due to changes in the proportion of individuals in social housing. In the UK there is a system of subsidized housing, often referred to as local authority, social or council housing. Those who are allocated a property pay a below-market rent, and the landlord will be either the local authority or a housing association. Individuals entitled to such a rental property are placed on a waiting list until suitable accommodation becomes available. While entitlement to live in social housing is subject to a strict means test, once allocated a property, tenants can usually stay for life irrespective of any changes in circumstance. Social renters have a severely reduced incentive and ability to move or to downsize their property, for

several reasons. Even if a tenant's current circumstances mean that they are still entitled to social housing, moving can be very difficult because of shortages of social housing. Existing tenants are treated the same as new applicants, so if they are not in a priority group, they may not be allocated a different property. For those whose circumstances have changed in such a way that they would no longer be entitled to social housing if they were to reapply, there is a large incentive not to move as they may not be allocated a different property at all and may have to move into the private sector and pay full market rent.

There has been a sharp across cohort decline in social rental housing in the UK that parallels the increase in home ownership across cohorts (which again for space considerations we do not plot). There was an almost 30 percentage point decline in the fraction of British households in social rental housing, which is pretty much the same percentage point increase observed in home ownership. Over the same set of birth cohorts, ages, and years there was little change in the fraction of households in private rental housing. These changes reflect the introduction of a 'Right-to-buy' in 1980 which required local authorities to sell council-owned housing at a discount to eligible tenants (the policy was later extended to other forms of social housing).

The final important set of patterns in housing to consider refer to an differential downsizing in the two countries at older ages. Downsizing refers to the size of dwellings in which one lives as proxied by number of rooms. In a recent paper (Banks et al. 2010), we showed that downsizing was much more common and larger in the United States compared to the UK. The absence of downsizing in the UK was largely due to the considerably smaller geographically mobility in the UK—among those households who did move the reduction in number of rooms was similar in both countries.

IV. Health and the Divergence of Medical Expenditures

Our health measures are based on self-reported health status, age specific mortality rates, and out-of-pocket medical expenditures by cohort, age, and gender. Neither the CEX nor LCFS include information on health or mortality, so we draw these from other sources, For the UK health status data come from two cross-sectional surveys, the Health Survey for England (HSE) and the General Household survey (GHS). These surveys contain information on household's self-reported health which we average by age, sex and cohort. Two surveys are used as we do not have GHS data after 2006, and HSE data before 1991. GHS data are used up to 1997 and HSE from 1997 onwards.

A. *Health Status*

In the GHS respondents are asked about their general health status over the last 12 months which they answer on a three point scale: answers can be "Good", "Fairly good", or "Poor". In the HSE, households are asked to report their general health on a 5 point scale "Very good", "good", "fair", "bad", or "very bad". For consistency we group these into three categories (by putting the final three responses into a single "worst health" group). We then average health status by age, year, and sex and use this information to impute the health of the head of household in the LCFS. To this we add data on mortality rates by age, sex and cohort/year from the ONS Mortality tables.

For the US we use the National Health Interview Surveys (NHIS). NHIS is an ongoing nationwide survey of about 40,000 households. Since 1982, NHIS used a 5 point scale to measure respondents' general health status "Would you say your health in general was excellent, very good, good, fair, or poor?" We create three categories for consistency with our UK measure. These three groups are "excellent" or "very good", "good", and "fair" or "poor". We use these to impute health statuses to household heads in the CEX in the same way we do for the LCFS. We also calculate the proportion of responses that are self-reported in each cell to use as a control. Mortality data for the United States are obtained from the Berkeley life tables which also give death rates by age, gender and year (http://www.demog.berkeley.edu /~bmd/states.html).

Figure 5 plots proportions of those in worst health in both countries showing several distinct patterns in health status in both countries. First levels of worse health are always higher in the UK than in the US. However, these different levels of subjective health status in the UK compared to the US have been shown to be due to different subjective health thresholds between the two countries. In the age groups we are considering the British are typically healthier than the Americans with prevalence of almost all diseases higher in the US compared to the UK (Banks et al. 2006). At the same objective health levels, the British report themselves in worse health on subjective scales.

The second pattern to note in Figure 5 is that the fraction of a cohort in poor health rises with age in both countries. Between ages 45 and 70 the fraction in worse health increases by about 15 percentage points which in the US implies an almost a doubling of the fraction. These growing levels of poor health with age are no doubt understated somewhat since rising mortality with age is removing some of those in worse health from the sample as we move to the next age group.

The third pattern concerns cohort effects in these paths of health at older ages. There is little evidence of cohort differences in the UK; cohort differences are however apparent in the US. The impact of declining health on consumption decisions in a life-cycle model will depend on how it affects the marginal utility of consumption. If poor health reduces the marginal utility, then we will observe that consumption declines more steeply with age as health deteriorates. Various papers have investigated the dependence of the marginal utility of consumption on health without achieving consensus on either its sign or magnitude (see Finkelstein, Luttmer and Notowidigdo (2009) for a survey of the available literature). Lillard and Weiss (1997) find that there is substantial positive effect on marginal utility using panel data on consumption (as inferred from income flows and asset changes) and health shocks.

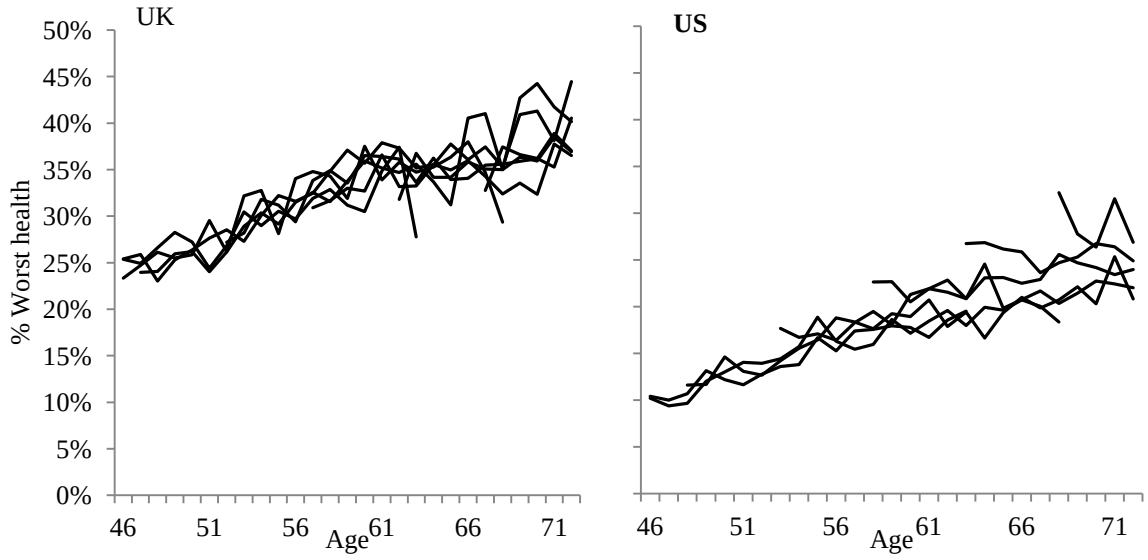


Figure 5. Proportion of Responders in Worst Health by Cohort and Age

Note: Data for the UK is from the HSE and GHS surveys spliced together (adjusted to remove discontinuity between the surveys). Data for the US is from the NHIS. Each line represents proportion of household heads reporting being in the worst health condition at each age for 5- year birth cohorts over the periods they are observed.

On the other hand, using changes in subjective well-being in response to health shocks for individuals with different permanent incomes to infer the effect of health on the marginal utility of consumption, Finkelstein, Luttmer, and Notowidigdo (2008) find a substantial negative effect. Other studies have essentially found no effect. De Nardi, French and Jones (2010) estimate a model allowing preferences over consumption to be health dependent. They find that the parameter governing the effect of health on the marginal utility is negative but statistically insignificant.

The age paths of worse health in Figure 5 seem pretty similar in the two countries so differential declining health at older ages does not appear to be a likely reason for the quite different paths of nondurable consumption in the two countries in Figure 1.

B. *Age Paths of Mortality*

In the standard life cycle model, higher age specific mortality risk acts very much like a decline in the interest rate encouraging current consumption and producing a steeper decline in consumption with age. Mortality risk rises steeply with age in both countries with mortality risk about ten times larger at age 70 compared to age 45. There also appears to be clear evidence of cohort improvements in mortality that are larger in the UK compared to the US. Due to considerations of space, we do not graph this. However the shape of the age mortality risk function appears to be by and large similar in the two countries suggesting once again that differential mortality risk by age does not appear to be the likely source of the significantly differently age shapes in consumption in the two countries documented in Figure 1 (Hurd 1989).

C. *Out of Pocket Medical Expenses*

On the health side of potential explanations, we have so far explored age patterns at older ages in general health status and mortality. While both dimensions of health undoubtedly play a role in shaping consumption profiles at older ages their ability either alone or together to account for the much flatter nondurable consumption with age in the United States compared to the UK seems limited. The final dimension of health we examine—out of pocket health expenditures—appears to us to offer far more potential since there are large differences between the two countries.

The manner in which health costs are financed at older ages in the two countries between the state and individual are quite different. To a large extent, all UK medical costs are paid by the state and very little is absorbed by the individual. This not only includes medications, doctor visits, and hospitalizations but long term care costs as well. This is clearly documented in the UK graph in the first panel of Figure 6 which demonstrates not only that as a share of the budget that out of pocket medical costs are relatively low (under 5 percent) but that the rise in this share with age and any cohort effects are quite modest.

The situation is very different in the US. In contrast to the UK, the US graph (the second panel of Figure 6) indicates not only much higher medical costs shares at older ages in the United States but sharply rising medical cost shares with that are certainly not due solely to cohort effects. To illustrate, medical costs shares in the United States are approximately

eight percent at age 45 and rise steadily until they are around 20 percent of the total budget by age 70.

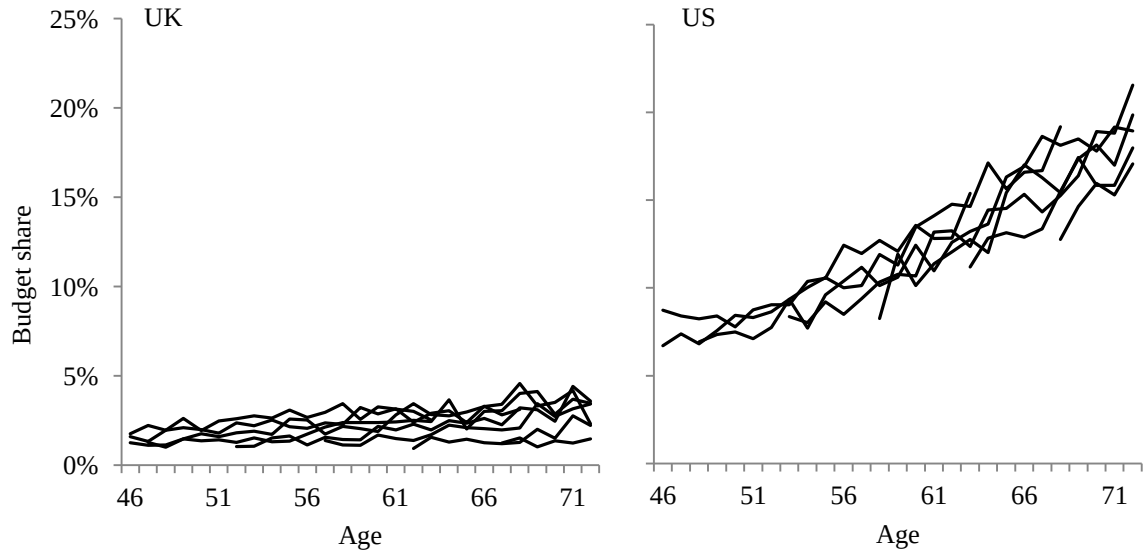


Figure 6. Share of Cohort Spending on Medical Care

Note: Data from LCFS in the UK and CEX for the US. Each line represents average budget shares out of nondurable expenditures at each age for 5- year birth cohorts over the periods they are observed.

This growth in medical expenses in the US continues notwithstanding the fact that most households will become eligible for the social insurance scheme Medicare at age 65. This scheme covers certain treatments (including some prescription drugs, medical equipment and in- and out-patient care) in exchange for monthly premiums. Co-payments and deductibles are also occasionally demanded of beneficiaries. Individuals may also opt to be covered by more generous private insurance plans in exchange for larger payments under Part C of the scheme.

Table 2 lists the distribution of out-or-pocket medical expenses for a population sixty plus in the US using the 2002 wave of the HRS. These distributions are presented for both a two year period (2000-2002) and a six year period (2000-2006). A number of salient patterns are illustrated. While these costs are substantial, there is enormous variance across and within people over time. While there are costs in all categories in Table 2, the sub-categories that are most important are private insurance costs and prescription drug costs.

In the last two columns of the A panel of Table 2, we list estimated coefficients from models of wave 7 (2004) and wave 8 (2006) medical expenditures on wave 6 (2002) expenditures by total expenditures and sub-categories. These coefficients illustrate significant

degree of persistence in medical expenses making their long-term costs large but far from complete within person persistent illustrating a great deal of uncertainty.

Table 2A: Out-of-Pocket Household Medical Expenditures, 2000-2002, Age 60+

Variable	Mean	P25	Median	P75	P90	P95	Persistence:	
							2-year	4-year
Total	8,690	1,250	4,472	10,582	19,600	28,409	0.658	0.589
Total No insurance	5,401	610	2,030	5,188	10,710	17,359	0.567	0.499
Hospital	443	0	0	0	250	1,200	0.215	0.170
Nursing home stays	463	0	0	0	0	0	0.416	0.339
Outpatient	109	0	0	0	50	400	0.197	0.149
Doctor visits	614	0	80	400	1,240	2,500	0.516	0.463
Dental	661	0	120	650	2,000	3,000	0.625	0.567
Prescription drugs	3,062	144	936	2,520	6,000	9,600	0.602	0.317
Home health care	33	0	0	0	0	0	0.556	0.107
Special health facility	16	0	0	0	0	0	0.148	0.144
Medicare HMO	376	0	0	0	1,296	2,400	0.282	0.230
Private insurance	2,746	0	0	3,600	8,400	12,072	0.628	0.544
Long-term care insurance	7,811	2,146	0	0	0	720	0.742	0.710

Table 2B: Out-of-Pocket Household Medical Expenditures, 2000-2006, Age 60+

Variable	Mean	P25	Median	P75	P90	P95
Total	27,668	6,411	17,312	36,024	62,520	84,524
No insurance	17,556	3,598	9,160	19,600	36,954	59,573
Hospital	1,220	0	0	200	2,000	5,100
Nursing home stays	2,074	0	0	0	0	300
Outpatient	345	0	0	25	620	1,750
Doctor visits	1,675	50	450	1,515	4,355	7,333
Dental	2,178	0	800	2,800	5,910	8,800
Prescription drugs	8,735	1,200	3,840	9,360	17,904	26,832
Home health care	161	0	0	0	0	0
Special health facility	81	0	0	0	0	200
Medicare HMO	885	0	0	0	2,712	5,280
Private insurance	8,286	0	3,000	11,568	24,360	34,560
Long-term care insurance	1,827	0	0	0	4,911	12,880

Since these medical costs are included in total nondurable expenditures in Figures 1 and 2, they may account for the slower decline in spending in the US relative to the UK. Consumption of medical services may be on the increase in both countries, it is just that this is only reflected in terms of greater expenditures in the US (as in the UK these costs are borne by the state).

V. Within-period Expenditure Allocations

In the previous sections we have noted the possible links between trends in demographic variables and consumption at older ages. We have highlighted differences in particular in the decline in employment, and in the pattern of home ownership between the two countries. We have also noted the strikingly different pattern of medical expenditures, summarised in Figure 6, largely reflecting differences in the delivery of health services in the US and the UK.

We now turn look more formally at possible interactions between demographic variables and consumption, which could affect the age path of consumption. Such non-separabilities may be present *within period* (affecting relative demands for particular goods but not the level of spending) or *across time* (affecting the inter-temporal allocation of consumption). In this section, we examine the shares of expenditure on different goods and looking for within-period non-separabilities. We turn to intertemporal interactions in the next section.

A. *A Model for Demand*

To explore how these operate within-period in the two countries we run the following consumer demand model:

$$w_{ik} = \alpha_{ik} + \sum_{k}^{N} \gamma_{ik} \ln p_k + \beta_k \ln\left\{\frac{x_i}{a(p)}\right\} + \theta_k \ln\left\{\frac{x_i}{a(p)}\right\}^2$$

where w_{ik} is the budget share of individual *i* for each of the *N* goods *k*, p_k is the price of good *k* and x_i is total expenditure on the goods included in the demands system by individual *i*. There are *M* demographic variables z_{mi} for each individual *i* including housing, employment, health and mortality are included in α_{ik}

$$\alpha_{ik} = \alpha_{k0} + \sum_{k}^{M} \alpha_{mk} z_{mi}$$

Expenditures are deflated using the price index

$$\ln a(p) = \alpha_O + \sum_{k}^{N} \alpha_k \ln p_k + \frac{1}{2} \sum_{l}^{N} \sum_{k}^{N} \gamma_{lk} \ln p_l \ln p_k$$

This model differs slightly from the Almost Ideal specification of Deaton and Muellbauer (1980) in that it includes an additional quadratic term on income (though falls short of the fully integrable QUAIDS model (Banks et al. 1998)). Our interest is in establishing the nature of within-period non-separabilities between consumption and housing, health and employment in the two countries through the effect of these variables on household budget shares. By including total expenditure and prices, we control for differences in the trends in relative prices and wealth across the different birth cohorts and the two countries which may otherwise confound our estimates. The use of the household specific price index *a(p)* means that income deflators can vary across groups according to their differing consumption patterns.

Prices for each of our categories are computed from the individual components and sub-indices of the UK Retail Price Index and the US CPI, which go back to 1978 and 1988 respectively.[2] Typically, sub-indices are not available for the particular category grouping we use (defined above in Table 1) so we calculate price indices in each cohort-year for each category *k* using a Stone price index

$$p_k = exp\left(\sum_{j=1}^{Nk} w_{jk} \log p_j\right)$$

where w_{jk} is the cohort-year budget share of good j (say "pet care") within some spending category k for which there are *Nk* goods in category *k* for which we want a price (e.g. "other nondurables").

We include sex, number of children and number of adults, and linear and quadratic time trends as controls in all the models we report below. We also include dummies for being over state pension age in the UK (60 for women, 65 for men) and for being over 65 in the US. These are included in order to control for the effects of Medicare (to which US households become eligible at 65) and benefits such as free-prescriptions, the Winter Fuel Payment, and transport subsidies which UK households become eligible for at state pension age. We do not control for age – our view is that age is usually included as a proxy for health and mortality effects, and these are affects that we are directly interested in (and include separately). The health and mortality variables are cell averages for the population (by age, year and sex) based on the data we described in Section IV above. We instrument expenditure using income (dummying out changes in the income question in the CEX that occurred from the 2nd

[2] The authors are grateful to Brendan Williams of BLS for constructing price indices that go back to this date.

quarter of 2001—introducing a bracketing question for those who failed to report their incomes—and income imputation which was introduced in 2004).

B. *Empirical Results*

Our results for the α_{mk} coefficients of interest are shown in Table 3 for the UK and Table 4 for the United States which we now discuss in terms of the main categories of interest. The particular specification of the demographic variables, *z*, includes: (1) housing tenure with dummy variables for being a renter and housing owners with no mortgage so that the reference group are owners with remaining mortgages; (2) marital status represented a dummy variables for being single; (3) employment proxied by two dummies—household head employed and both partners working; (4) the log of mortality of the head obtained from life tables described above in Section IV; (5) the health of head captured by two dummies for good and medium health with worse health as the reference group.

In both countries those who rent not surprisingly spend a lot less on housing related expenditures. In the US the share spent on housing related expenses is 10 percentage points lower share than those who own. In the UK the equivalent number is 4 percentage points. The estimates in Tables 3 and 4 indicate renters consequently devote higher shares to all other goods save medical expenses (and food at home in the US), with a particularly large effect for other nondurable spending. Owning a home outright (compared to owners who still have a mortgage to pay off) leads to small reduction in housing related expenses in both countries (though the effect is only significant at the 10 percent level in the UK).

Employment effects look as expected – in both countries when the head is employed less is spent on recreation and more is spent on food out and on transport, which is most likely associated with transport to work. Employment in the United States is associated with more food consumption both in and out of the home, but in the UK there is a substitution of food consumption to out of the home. When both head and spouse are working, there is a reduction in spending on food at home in the US.

Table 3. UK Demand System α_{mk} Coefficients (1978-2009)

	Food in	Food out	Othnd	Medical	Hrelated	Recrea	Transport
Mean Budget Shares:	**23.90**	**5.10**	**25.52**	**1.85**	**23.14**	**7.52**	**12.98**
Single	-6.17	2.65	3.36	-0.30	-2.74	0.05	3.15
	(0.12)	(0.07)	(0.18)	(0.07)	(0.15)	(0.16)	(0.14)
Renter	0.84	0.38	3.38	-0.07	-3.97	0.22	-0.77
	(0.09)	(0.06)	(0.13)	(0.05)	(0.11)	(0.12)	(0.11)
Own-outright	0.15	-0.08	-0.76	0.16	-0.16	0.90	-0.21
	(0.08)	(0.05)	(0.12)	(0.04)	(0.10)	(0.10)	(0.09)
Head-employed	-0.13	0.67	-0.37	-0.00	-0.86	-0.47	1.16
	(0.09)	(0.05)	(0.12)	(0.05)	(0.11)	(0.11)	(0.10)
Both work	-0.43	0.17	0.76	-0.12	-0.57	0.41	-0.21
	(0.10)	(0.06)	(0.14)	(0.05)	(0.12)	(0.12)	(0.11)
ln(mortality)	0.96	-0.09	-1.69	0.31	0.58	0.25	-0.33
	(0.07)	(0.04)	(0.10)	(0.04)	(0.08)	(0.09)	(0.08)
Worst health	-0.06	-0.77	-0.51	0.03	0.58	0.13	0.59
	(0.53)	(0.33)	(0.74)	(0.29)	(0.64)	(0.65)	(0.57)
Constant	55.96	-5.07	2.00	0.93	54.48	-2.57	-5.74
	(0.57)	(0.35)	(0.81)	(0.31)	(0.69)	(0.72)	(0.65)

N=86,805, standard errors in parentheses in parentheses. Additional controls for log expenditure, log expenditure squared, number of children, number of adults, dummy for whether head or spouse has compulsory education, a quadratic time trend, being over state pension age and self-reported health missing. Expenditure is instrumented using income.

Important differences emerge in the relationship between employment and health costs, however. In the United States where people bear more of the responsibility for paying their medical costs, head's employment reduces out of pocket medical expenses, a much larger effect than in the UK which is essentially zero. Although this could partly be explained by incomplete controls for health in the model, the key difference is the association between medical insurance and being in a job in the United States during this period. In the US, the head being employed reduces the proportion spent on medical spending by 1.4 percentage points but there is no similar effect in the UK. This could reflect employers meeting some healthcare costs for their employees in the US (which in the UK would be met by the state). Whether the spouse works or not, does not appear to contribute to this effect.

Table 4. US Demand System α_{mk} Coefficients (1988-2009)

	Food in	Food out	Othnd	Medical	Hrelated	Recrea	Transport
Mean Budget Shares:	21.91	6.59	18.27	11.98	19.68	4.42	17.14
Single	-4.73	3.14	2.43	-3.73	-0.49	1.26	2.16
	(0.26)	(0.16)	(0.24)	(0.25)	(0.25)	(0.14)	(0.24)
Renter	-0.44	2.29	5.18	0.25	-10.02	1.34	1.46
	(0.29)	(0.18)	(0.26)	(0.27)	(0.28)	(0.15)	(0.27)
Own-outright	0.03	0.49	-0.74	0.80	-0.49	0.11	-0.20
	(0.14)	(0.09)	(0.13)	(0.13)	(0.14)	(0.07)	(0.13)
Head-empl.	1.08	0.35	-0.89	-1.34	-0.02	-0.26	1.04
	(0.20)	(0.12)	(0.18)	(0.19)	(0.19)	(0.10)	(0.18)
Both work	-2.08	0.51	1.49	-0.30	-0.77	0.24	0.94
	(0.19)	(0.12)	(0.17)	(0.18)	(0.18)	(0.10)	(0.17)
ln(mortality)	-0.37	-0.46	-1.66	2.46	0.98	-0.11	-0.84
	(0.15)	(0.09)	(0.13)	(0.14)	(0.14)	(0.07)	(0.13)
Worst health	-0.50	-0.35	3.01	-1.63	-1.63	-0.84	2.00
	(0.71)	(0.43)	(0.64)	(0.67)	(0.68)	(0.36)	(0.65)
Constant	49.87	-5.69	0.25	22.19	38.50	-3.95	-1.54
	(1.50)	(0.96)	(1.37)	(1.43)	(1.47)	(0.80)	(1.38)

N= 43,679, standard errors in parentheses. Additional controls for log expenditure, log expenditure squared, number of children, number of adults, dummy for whether head or spouse has compulsory education, a quadratic time trend, being over state pension age and self-reported health missing. Expenditure is instrumented using income (with dummies for year greater than 2001 and year greater than 2004, when changes to the survey income questions were introduced).

Our mortality and subjective health measures capture variations in health status that occur on average at the cohort level rather than individual level variation. A higher risk of mortality among the cohort increases medical spending in both the US and UK, with perhaps unsurprisingly in light of the differential financing of medical care in the two countries, a much larger effect in the US. In the UK reductions in subjective health controlling for mortality have little effect on the composition of total household consumption (except for a reduction in spending away from home). In contrast, a worsening of the cohort's subjective health status in the United States leads to an apparent *reduction* in medical expenses once the effects of mortality are controlled for. This likely reflects some difference in health spending among cohorts that we have not been able to control for (for instance, those caused by institutional changes in Medicare coverage or changes in the availability of expensive, technology-intensive health services over time).

Comparing the positive impact of mortality probabilities on medical spending with the zero or negative effects for self-reported health suggests an Easterlin-type paradox in the relationship between subjective health measures (captured in our self-reported measures) and objective health measures (captured in our case by mortality). By this we mean that subjective measures of health may not improve even when objective measures of health do. This might occur for instance if people assess their health relative to others in their cohort (so self-reported health status would tend to vary within but not between cohorts), weakening its association with actual health conditions and so medical expenditures.

VI. Inter-temporal Allocations of Consumption

The estimates from the previous section have shown differences in health, labor supply, mortality and tenure can significantly alter the patterns of spending within any given period. These effects were also found to differ across the UK and the US, especially in relation to medical expenditures. We now turn to consumption changes over time and the role of differences in the lifetime pattern of demographics and medical expenditures. To do this we aggregate data into averages for cells defined by education (whether or not the household head completed high school), year and 5-year birth cohorts to construct pseudo-panels in the manner of Browning, Deaton, and Irish (1985).

A. *Growth Rates in Consumer Expenditures*

Our demand system estimates show that there is a much greater shift towards medical spending as age increases in the US than in the UK, and this is partly arising through non-separabilities with employment, perhaps due to the importance of employer-provided health insurance. This suggests an important role for medical costs in explaining the different age-profiles of expenditure. Table 5 shows the average rates of decline in spending for nondurable goods, and nondurable goods not including medical spending for our cohorts. The difference between the two countries shrinks by just over a quarter when medical spending is taken out, suggesting that differing healthcare financing institutions may explain a significant part of the difference.

In addition to the role of medical expenses, the results in the previous section highlight the potential importance of other non-separabilities relating to for instance housing and employment. To see the extent to which controlling for differences these and other in

demographic trends can explain the steeper decline in nondurable consumption less medical expenses that we see in the UK we run a regression of the following form:

$$\Delta \ln c_{s,k,t} = \alpha_0 + \alpha_1 t + \alpha_2 k + \gamma US + \theta \ln M_{s,k,t} + \Delta X_{s,k,t}\beta + u_{s,k,t}$$

where *k* denotes cohort, s denotes country and *t* year. $c_{s,k,t}$ denotes nondurable consumption, $M_{s,k,t}$ is the mortality rate and $X_{s,k,t}$ is a set of demographic controls (including health, housing status and employment), and *US* is a dummy for the United States.[3] The coefficient γ indicates the size of the difference in the decline of US expenditures relative to the UK once the other factors have been controlled. To assess the possibility that these effects differ across the two countries, we test the significance of interactions between right hand side variables and a US dummy (except the constant). These tests cannot reject that coefficients in the two countries are the same (with a P-value of 0.28), suggesting that a pooled model is appropriate.[4] Table 6 shows the results. The coefficient on the US dummy is statistically significant and of the order of 1.5 percent, only slightly smaller than the unconditional difference in Table 5.

Table 5. Average Growth Rates in Expenditure

	UK	US
Nondurable	-3.29%	-1.03%
Nondurable (less medical)	-3.35%	-1.70%

Notes: Observations weighted by cell size.

There may be some risk of endogeneity in the above estimates. For example, a shift in preferences away from consumption towards leisure could for instance be mistaken for evidence of a non-separability (consumption would fall as leisure rose). Unanticipated shocks could also affect right hand side variables, and simultaneously lead consumers to reassess the value of their wealth (and hence revise their consumption downwards). To address such concerns, we instrument the changes employment, housing tenure, health and mortality with

[3] This consumption growth model differs from the standard Euler equation that are typically estimated, see Banks, Blundell and Tanner (1998), for example, in that it does not directly include the real interest rate. When included as a variable it appears that UK and US households show quite different sensitivity to interest rate changes, suggesting that it is picking up macroeconomic changes and not just differences in relative prices over time and across countries. We thus omit it from our analysis in what follows and include time effects instead.
[4] Separate regressions for each country, along with pooled models including medical and housing related expenditure, are included in the appendix.

their first and second lags (which should be correlated with current realisations but uncorrelated with taste shifts or expectational errors). The results, shown in column (2) of Table 6, are similar. The size of the US dummy is essentially unaffected, and coefficients on employment and the number of adults remain positive and significant (and the magnitude of the employment coefficient increases). The coefficient on owning ones homes outright becomes significant, but the coefficient on renter is now no longer significant.

Table 6. Growth in Nondurable Consumption (Pooled Model)

	WLS	W2SLS
	(1)	(2)
US	0.015***	0.016***
	(0.005)	(0.006)
Log Mortality	-0.034	-0.036
	(0.025)	(0.030)
ΔHead employed	0.145***	0.275**
	(0.049)	(0.117)
ΔRenter	-0.379***	-0.257*
	(0.063)	(0.131)
ΔOwn outright	0.042	0.245**
	(0.057)	(0.122)
ΔNumber of kids	-0.032	0.019
	(0.039)	(0.049)
ΔNumber of adults	0.257***	0.261***
	(0.029)	(0.033)
ΔSingle	-0.113*	-0.07
	(0.058)	(0.069)
ΔWorst health	-0.124	-0.163
	(0.087)	(0.34)
N	582	540
R^2	0.37	0.40
Sargan P-value	n.a.	0.18

* p<0.10, **p<0.05, ***p<0.01, Estimates presented are Weighted Least Squares and Weighted Two Stage Least Squares with weights being given by cell sizes in each education-year-cohort cell. Non-durable consumption less medical expenditures. Additional controls for switch from GHS to HSE, change in proportion of households reporting own health in US, change in proportion responding to subjective health questions, education group, a linear cohort effect and time trend. Instruments are first and second lags of employment, renter and own outright, health and mortality (and GHS, self-report dummies).

B. *Uncertainty in Medical Expenditures*

The results so far suggest that there remains a large unexplained difference in the growth rates of consumption at in the two countries. What might explain this? One omitted factor from our analysis so far is any uncertainty over future consumption which may well differ across the two countries, particularly as US households are exposed to a greater risk of high out of pocket medical expenses than UK households (as suggested by the distribution of expenditures presented in Table 2 above). A risk of having high medical expenditures should introduce a precautionary motive to delay consumption – twisting consumption profiles in a way that reduces their initial level and gives them a less steep gradient. Figure 7 shows the average dispersion in medical expenditures as measured by the inter-quartile range within cohorts and two education groups: those where the household head has compulsory schooling or less, and those where they have at least some college education. Not only is the variation in medical spending much greater in the US than the UK for both groups, in the US there is evidence of a steeper age gradient in the variance in medical expenses. Some individuals may end up facing much higher medical expenses at older ages than others. To the extent that this is not known to individuals beforehand, theory suggests it is should result in higher savings (and hence lower consumption) at younger ages in the US.

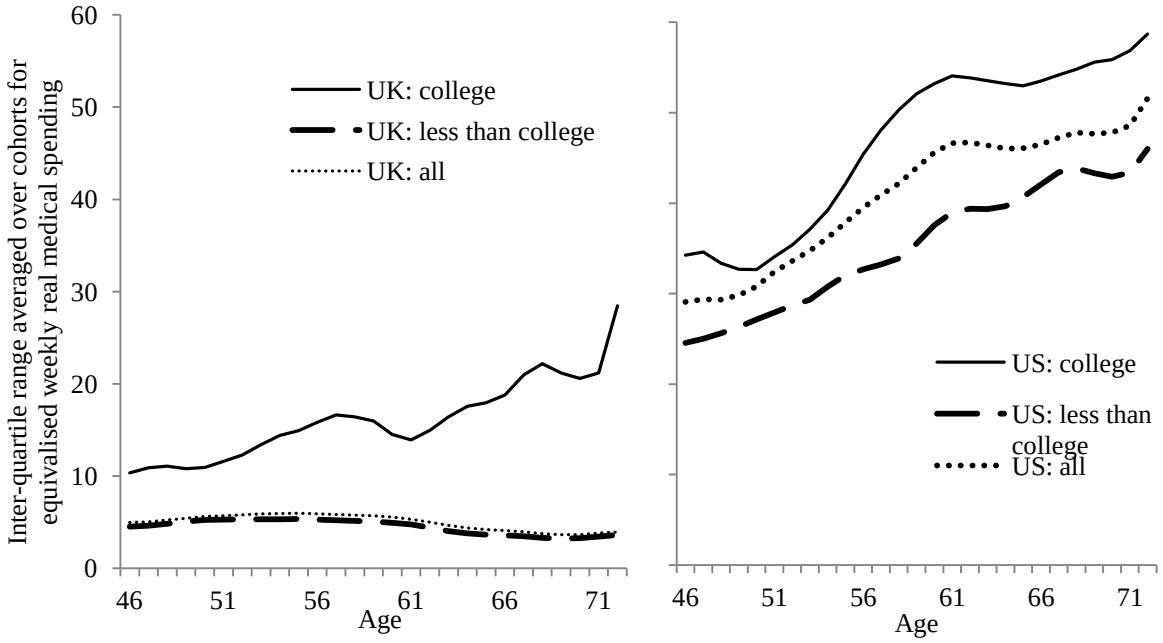


Figure 7. Average Interquartile Range in Medical Spending across Cohorts by Education of Household Head, US and UK

Note: Data from LCFS in the UK and CEX for the US. Averages weighted by cohort size. Interquartile ranges are taken within 5-year birth cohorts for the periods we observe them. Lines smoothed using local linear regression with a bandwidth of 0.3. Values are in US$ (2010).

Figure 7 also reveals differences in the variation of medical expenses between the college educated and the less educated, which might suggest that precautionary motives are greater for the one group than the other. We show the levels of expenditure for college educated households in the two countries in Figure 8, although it should be noted that this is a small group of the population and the resulting profiles are noisy. Nevertheless, the decline in spending for college educated households is much less in the UK when compared with the average decline in Figure 2, and much more similar to the decline observed in the US.

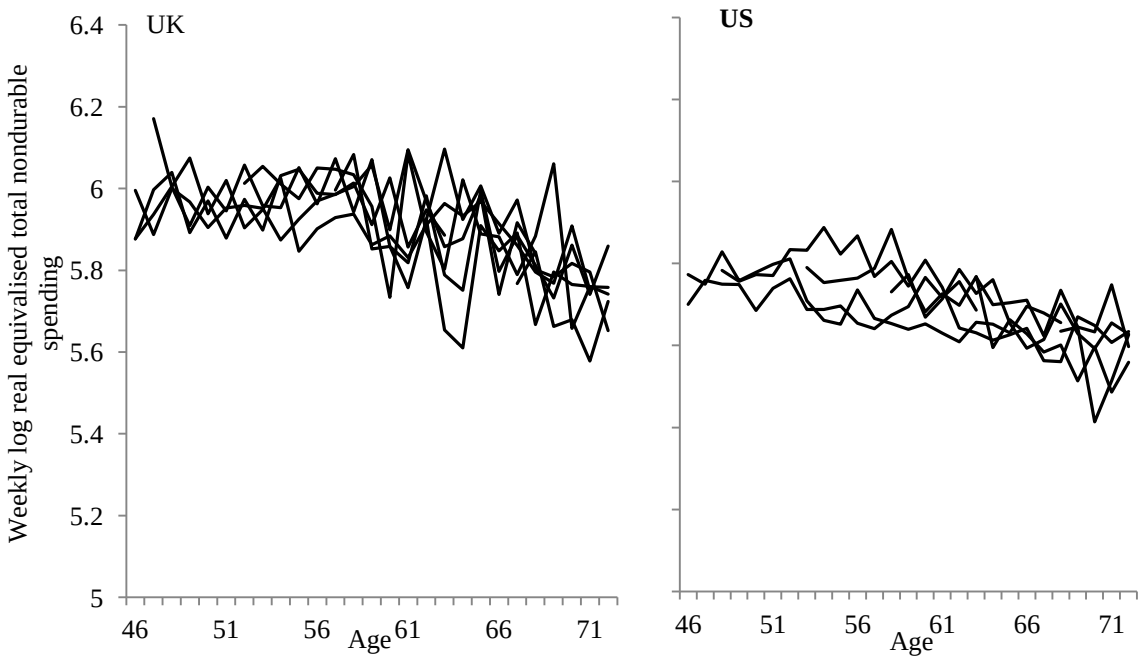


Figure 8. Nondurable Spending by Cohort and Age, College Educated

Note: Data from LCFS in the UK and CEX for the US. Each line represents average nondurable expenditures for college educated household heads at each age for 5- year birth cohorts over the periods they are observed. Ages are the midpoints of each cohort in each year. Values are in US$ (2010).

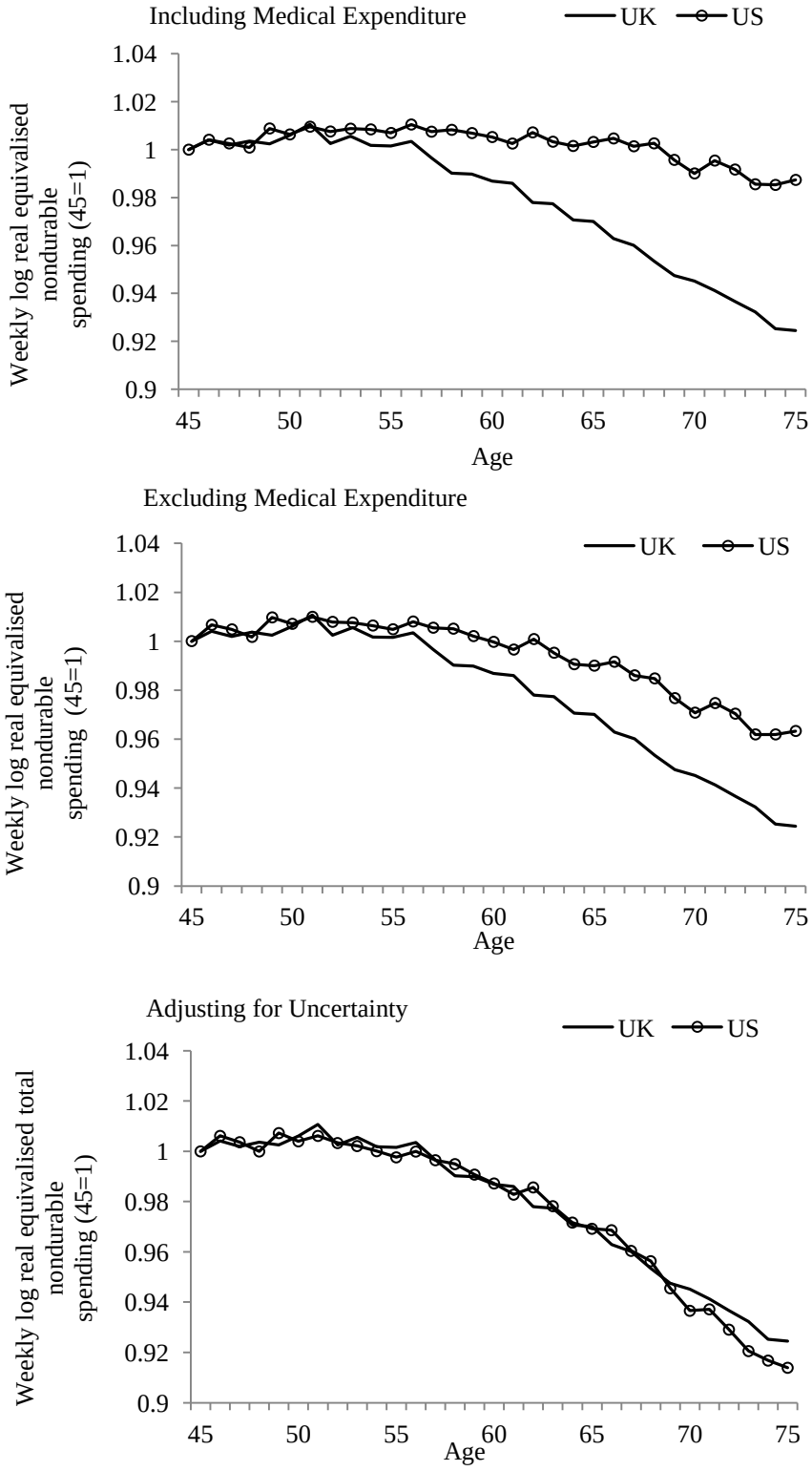
It remains to be considered whether a greater demand for precautionary savings in the US could plausibly explain the smaller decline in expenditures for other US households. To answer this, we need to get an idea of the scale of precautionary motives by treating shocks to medical expenses as shocks to the consumer's wealth. A simple theoretical analysis such as that in Banks et al. 2001 suggests that the effect of uncertainty over shocks to future medical expenses on consumption growth will depend on the product of three factors $k\pi_t^2\sigma_t^2$, where k is a constant scaling factor reflecting both the persistence of shocks and the consumer's risk

aversion, π reflects the contribution of uncertainty in medical expenses to uncertainty in overall wealth (that can be approximated by ratio of medical expenses to nondurable consumption excluding medical) and σ_t^2 is the variance in medical expenses conditional available to each individual consumer in period *t-1*. This variance term must of course not include any predictable changes in medical expenses, as these do not generate precautionary motives.

Of the three factors, π can be readily estimated from our cross-sectional data (which we do using cohort level averages by education group). The choice of k is less straightforward. We take k to be unity, roughly what is estimated in Banks et al., although their study relates to income shocks as opposed to health expenditure shocks and the two may exhibit a different degree of persistence and so we carry out some simple sensitivity analysis below. Finally, for the conditional variance of medical shocks in the US we make use of estimates calculated in French and Jones (2003) using panel data on medical expenditures available in the Health and Retirement Survey. Summing the unpredictable components of the variance for model 4 of their paper suggests a conditional variance of 0.7 for two years. We halve this to get an annual figure (0.35) for the variance in the US, and assume no risk in medical expenses for UK households.

Figure 9 provides a striking picture of the impact of medical expenditures and medical expenditure uncertainty. The first panel shows average consumption levels across the two countries by age, using the same cohort averaging as in Figure 1 of this paper but now normalising the levels in each country to 1 at age 45. The second removes medical expenditures and, as suggested by Table 5 above, this closes the gap but not by nearly enough. The third removes the uncertainty component and shows the precautionary motive to be of a magnitude sufficient to completely eliminate the differences in consumption growth between the two countries. Indeed, once precautionary motives of this scale are removed from US spending, spending declines slightly more than it does in the UK. This may partly be explained by our choice of k which may be set too high if the effects of unanticipated income shocks are more persistent than those of medical shocks. A (substantially lower) value of k of about 0.75 would still give qualitatively similar results, and in fact would set the lines about equal by age 75.

Figure 9. Nondurable Spending Including Medical Expenditure, Excluding Medical Expenditure and Adjusting for Medical Expenditure Uncertainty



Note: Data from LCFS in the UK and CEX for the US. Values are in US$ (2010). See text for an explanation of the adjustments for uncertainty in medical expenditures.

VII. Conclusions

In this paper, we have compared consumption trajectories for older households in the UK and the USA. In the US, spending tends to remain relatively flat at older ages, while it declines quite steeply in the UK. This is despite that fact that other variables (employment, health and so on) tend to evolve in similar ways in both countries. A key component in explaining this difference is medical spending, which rises in the US much faster than in the UK where medical expenses tend to be covered by the state. Taking out medical spending from our comparison reduces the gap in the average decline in consumption spending by roughly a quarter. A substantial gap remains that does not disappear when other demographic variables are introduced. We find that greater precautionary motives in the US are a highly plausible explanation for the remainder of the difference.

These findings have relevance for discussions of consumption behavior at older ages. It is often found that older households, particularly in the US, tend to continue to amass wealth as they age (see for instance Love et al. 2009). Several papers have now discussed this and considered medical expenses as a possible cause (Palumbo 1999, DeNardi et al. 2010). In this paper, we point out and account for differences between US households and households in an environment where medical risks have been effectively eliminated and for whom spending declines by much more.

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Appendix

Table A.1. Growth in Nondurable Consumption (Including Medical)

	UK	US
Log Mortality	-0.05	-0.017
	(0.055)	(0.074)
ΔHead employed	0.127**	0.130*
	(0.063)	(0.078)
ΔRenter	-0.300***	-0.497***
	(0.092)	(0.087)
ΔOwn outright	0.170**	-0.094
	(0.084)	(0.076)
ΔNumber of kids	0.029	-0.091*
	(0.062)	(0.048)
ΔNumber of adults	0.321***	0.203***
	(0.044)	(0.038)
ΔSingle	-0.045	-0.215**
	(0.079)	(0.088)
ΔWorst health	-0.158	-0.057
	(0.101)	(0.166)
N	322	260
R^2	0.38	0.39

* p<0.10, **p<0.05, ***p<0.01, weighted by cell size. Additional controls for switch from GHS to HSE, change in proportion of households reporting own health in the US, change in proportion not responding to subjective health questions, education group, linear cohort effects and time trend.

Table A.2. Growth in Nondurable Consumption (Less Medical)

	UK	US
Log Mortality	-0.052	-0.029
	(0.056)	(0.076)
ΔHead employed	0.121*	0.184**
	(0.063)	(0.080)
ΔRenter	-0.313***	-0.457***
	(0.093)	(0.090)
ΔOwn outright	0.167*	-0.079
	(0.085)	(0.078)
ΔNumber of kids	0.042	-0.076
	(0.062)	(0.050)
ΔNumber of adults	0.317***	0.211***
	(0.045)	(0.039)
ΔSingle	-0.046	-0.190**
	(0.080)	(0.091)
ΔWorst health	-0.144	-0.073
	(0.102)	(0.171)
N	322	260
R^2	0.38	0.37

* p<0.10, **p<0.05, ***p<0.01, weighted by cell size. Additional controls for switch from GHS to HSE, change in proportion of households reporting own health in the US and change in proportion not responding to subjective health questions, education group, linear cohort effects and time trend.

Table A.3. Growth in Nondurable Consumption (Less Medical and Housing Related)

	UK	US
Log Mortality	-0.048	-0.039
	(0.063)	(0.086)
ΔHead employed	0.193***	0.169*
	(0.071)	(0.091)
ΔRenter	-0.248**	-0.314***
	(0.104)	(0.102)
ΔOwn outright	0.194**	-0.12
	(0.096)	(0.088)
ΔNumber of kids	0.092	-0.084
	(0.070)	(0.056)
ΔNumber of adults	0.343***	0.267***
	(0.050)	(0.044)
ΔSingle	-0.088	-0.276***
	(0.090)	(0.103)
ΔWorst health	-0.148	-0.084
	(0.114)	(0.194)
N	322	260
R^2	0.37	0.35

* p<0.10, **p<0.05, ***p<0.01, weighted by cell size. Additional controls for switch from GHS to HSE, change in proportion of households reporting own health in the US, change in proportion not responding to subjective health questions, education group, linear cohort effects and time trend.

Table A.4. Growth in Nondurable Consumption (Pooled Models)

	Including Medical	Less medical and housing related
US	0.023***	0.017***
	(0.005)	(0.006)
Log Mortality	-0.045	-0.051*
	(0.024)	(0.028)
ΔHead employed	0.123*	0.180***
	(0.048)	(0.055)
ΔRenter	-0.391***	-0.281***
	(0.062)	(0.071)
ΔOwn outright	0.035	0.041
	(0.062)	(0.064)
ΔNumber of kids	-0.047	-0.02
	(0.038)	(0.044)
ΔNumber of adults	0.255***	0.296***
	(0.028)	(0.033)
ΔSingle	-0.129*	-0.179***
	(0.057)	(0.065)
ΔWorst health	-0.130	-0.131
	(0.086)	(0.099)
N	582	582
R^2	0.39	0.35

* p<0.10, **p<0.05, ***p<0.01, weighted by cell size. Additional controls for switch from GHS to HSE, change in proportion of households reporting own health in the US, change in proportion not responding to subjective health questions, education group, linear cohort effects and time trend.