The effect of the financial crisis on the retirement plans of older workers in England

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Abstract

The financial year 2008/9 was associated with large falls in asset prices. This potentially resulted in a large shock to individuals’ wealth holdings, particularly affecting those close to retirement who have accumulated large amounts of wealth but have relatively little of their working lives left during which to react. This work uses data from the English Longitudinal Study of Ageing, a panel survey of the over-50 population in England, from before and during the financial crisis to simulate the impact of the financial crisis on the wealth holdings of older individuals. It then goes on to examine the extent to which individuals have planned to adjust to their wealth shock by delaying their retirement. It is found that though many individuals experienced a significant wealth shock, they do not generally seem to have delayed their planned retirement age in response. Individuals must therefore have chosen to adjust along other margins, such as consumption or planned bequests, or are perhaps as yet still unaware of the effect the financial crisis has had on the affordability of their retirement plans.

JEL codes: J26, D14, E21, G01

Key words: financial crisis, wealth, retirement plans

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1. Introduction

The recent financial crisis and recession were associated with large falls in asset prices. At the end of 2008 the FTSE 100 share index closed over 30% down on its level at the beginning of the year – the largest annual fall in the index’s 27 year history. UK house prices also fell markedly as economic uncertainty and the unavailability of mortgage credit to potential buyers reduced the demand for houses. Figure 1 describes the timeline of the crisis in the context of movements in the FTSE all-share index.

Figure 1: Timeline of the financial crisis in the UK

The falls in asset prices will have affected some individuals more than others. Those with more wealth will have had more to potentially lose, and those with relatively large proportions of their wealth invested in assets exposed to stock market movements or house price changes are likely to have been particularly affected. The group of older people approaching retirement are likely to have been particularly vulnerable to these changes in asset prices. Unlike those who have already retired, they typically hold relatively large amounts of wealth in unannuitised pension funds which, if they have not been invested in safer assets, will be exposed to movements in the stock market. They are therefore at high risk of relatively large wealth losses. However unlike younger individuals they do not have much of their (planned) working life remaining and this means that wealth losses will be more sorely felt. If older individuals want to avoid these losses reducing the resources they will have available in retirement without postponing their retirement they will need to save more than they had planned over their few remaining working years, whilst younger individuals would be able to spread such adjustment over a much longer period. Older individuals approaching retirement are therefore a group for whom the financial crisis is likely to have had relatively large and potentially permanent effects on their wealth. They have high rates of home ownership and large unannuitised pension funds, but little time to
adjust their behaviour to make up for any wealth losses before their planned retirement date.

If older individuals have experienced a permanent wealth shock as a result of the financial crisis then there are a number of margins along which they may choose to adjust. Individuals may decide to work more hours in their remaining years up to retirement than they had previously planned, in order to build up their retirement resources again, or they may choose to do this by delaying their retirement, which would also reduce the number of years of retirement that their resources would need to cover. Alternatively individuals may choose not to react to their wealth loss by altering their work plans and instead plan to consume less, either during retirement or in the run up to retirement. Finally, some individuals may not be planning on consuming all their wealth during their retirement anyway, most commonly because they are intending to leave a bequest. For these individuals a wealth loss may not impact upon their labour supply or their own consumption, but rather it could affect their intended bequest.

This work considers the effects of the crisis on the wealth of those aged 50 and over and estimates the impact of these changes on individuals’ planned retirement ages. While this is only one possible margin of adjustment, it is one that had not yet been explored in the UK and is therefore a significant new contribution to the literature.

The remainder of this document proceeds as follows. Section 2 provides an overview of the literature on the impact of the recent asset price changes on wealth, and the effects of unexpected wealth changes, in particular on retirement behaviour. Section 3 describes the theoretical framework that explains the change in retirement plans that might be expected, while section 4 describes the empirical approach taken to estimate the extent to which individuals adjust on the retirement margin. Section 5 discusses the data used. Section 6 presents some initial descriptives on wealth holdings, the simulated wealth shocks and the estimated required change in retirement plans, followed by the main results. Section 7 concludes.

2. Related literature

There is currently a relatively limited (though growing) literature that has attempted to investigate the impact of the recent financial crisis on wealth holdings. Since data on wealth holdings in the years covered by the financial crisis is only recently becoming available, and even then it is hard to distinguish the shock to wealth holdings, most of these studies simulate wealth losses using pre-crisis wealth holdings and national price indices. Bosworth and Smart (2009) find that on average US households aged over 50 would have lost nearly a fifth of their net wealth, while Gustman, Steinmeier and Tabatabai (2010) argue that individuals approaching retirement have relatively little invested in the stock market and tend not to want to cash out their home equity in the near future and so will not have suffered a substantial financial shock. For the UK, Banks, Crawford and Tetlow (2010) estimated that older households’ average losses from the crisis would have been relatively small as a share of either gross or net wealth, of the order of around 5%. More recently Banks, Crawford, Crossley and Emmerson (2011) have simulated that older households in
England on average will have experienced losses of around 10% of their gross wealth, around half from housing and half from assets exposed to the stock market.

This work focuses on whether older individuals responded to the wealth losses they experienced as a result of the financial crisis by changing their planned retirement age. There is a broad range of literature that explores the effect of unexpected wealth increases on retirement behaviour. The sources of unexpected wealth changes considered are those which are thought to be uncorrelated with individuals preferences for work versus leisure, and include inheritances (see Holtz-Eakin et al (1993), Joulfaian and Wilhelm (1994), Brown et al (2010), lottery winnings (see Imbens, Rubin and Sacerdote (2001)) and social security changes (see Krueger and Pischke (1992)). Taken together the results are mixed, with some papers finding support for wealth shocks affecting retirement and others finding little.

A subset of this literature are studies that investigate the effect of stock market changes on the retirement decisions of workers, but again the evidence has been inconclusive. Some have found that high stock market returns have led to earlier retirement (see for example Cheng and French (2000), Gustman and Steinmeier (2002), Coronado and Perozek (2003) or Sevak (2002)), while others have found no such effect (see for example Hurd and Reti (2001) or Hurd, Reti and Rohwedder (2005)). Several papers have explored how retirement decisions were affected by the US stock market decline that followed the dot-com bubble in 2000. Coile and Levine (2006) find no support for the hypothesis that those who were more affected differentially decreased their retirement rates, while Hurd, Reti and Rohwedder (2005) find some suggestion that the decline in the stock market led to an increase in the expected retirement age and Kezdi and Sevak (2004) find an ambiguous effect on labour supply. For Britain, Disney, Ratcliffe and Smith (2010) examine how retirement decisions were affected by fluctuations in asset prices and local labour market conditions between 1991 and 2007, and find little evidence that house prices or share prices influence retirement timing through wealth effects.

In terms of the recent financial crisis, Gustman, Steinmeier and Tabatabai (2010) have used data from the decline following the dot-com bubble to estimate a structural model of retirement and saving behaviour and use this to simulate the effects of the recent decline in the stock market. They estimate that the net effect of the stock market bust on US retirement decisions will have been relatively limited, with an average delay to retirement of just 1.5 months. Coile and Levine (2009) have also simulated the magnitude of retirement responses to the recent crisis, and estimate that the increase in unemployment associated with the recession will lead to more earlier retirements than the fall in the stock market will lead to delayed retirements, so that the net effect is for retirements to actually increase. Goda, Shoven and Slavov (2010) have investigated the relationship between stock market performance and retirement decisions over a period including the financial crisis. They find that retirement plans were shifted during the financial crisis, but do not conclude that this was caused by the decline in the stock market since they found no evidence of a relationship in earlier years, and there was no differential effect among those who should have been more affected by the stock market decline. McFall (2010) by contrast presents descriptive analysis that shows that the crisis did result in individuals delaying their planned retirement age, and finds that wealth losses were associated with an increase in the planned retirement
age of older Americans of around 2.5 months - a similar magnitude to that predicted by Gustman et al (2010).

There is little literature to date that has looked at the effects of the recent financial crisis in the UK. Banks, Crawford, Crossley and Emmerson (2011) find that wealth losses are associated with reduced expectations of leaving a large bequest, although the effects are relatively small. Crossley, Low and O'Dea (2011) consider household consumption through the recent recession and find that annual growth in consumption has been five percentage points below the average growth in non-recession years, despite loose monetary policy and a government fiscal stimulus package designed to increase household expenditure. There are currently no papers that consider the effects of the financial crisis on retirement plans in the UK. Therefore while this work is limited in the sense that it only considers one possible margin along which individuals could adjust to their wealth losses, it is still a significant contribution to the literature for the UK, and should be viewed alongside those papers that consider some of the other possible margins of adjustment.

3. Method

3.1. Theoretical framework

The likely effects of the financial crisis can be considered in the context of a very simple lifecycle model, following the classic model of Modigliani (Modigliani and Brumberg 1954, Modigliani 1986). For the purposes of this work the basic structure of the model is assumed as follows: Individuals start working life with zero assets and then earn income which can either be consumed or saved. When an individual reaches an age of their choosing they retire and earn no more income - consumption from then on is funded from accumulated wealth. Individuals are assumed to know their data of death, and can either run down all their savings by that point or leave residual wealth as a bequest. For this basic model such a path of wealth accumulation can be easily described graphically such as in Figure 2, where income and consumption are assumed constant purely for graphical simplicity.

Consumption in such a lifecycle model is chosen to maximise lifetime utility subject to an intertemporal budget constraint such as that in equation 1. This states that, at any given time $t$, the sum of the expected present discounted value of future labour income (wages $w_t$ multiplied by hours worked $h$), current assets ($A_t$) and pension wealth ($P^R$ for planned retirement at $R$) is equal to the sum of the expected present discounted value of future consumption ($C_t$) and any intended bequest ($B$).

$$\sum_{t=R}^{T} \left( \frac{1}{1+r} \right)^{T-t} w_t h + A_t + P^R = \sum_{t=R}^{D} \left( \frac{1}{1+r} \right)^{T-t} c_t + \left( \frac{1}{1+r} \right)^{D-t} B$$

(1)

The financial crisis potentially resulted in a large shock to the wealth holdings of individuals approaching retirement. This is modelled as a one-off shock to holdings of financial wealth, property wealth and private pension wealth. Future growth in the price of these assets is assumed to be unaffected - in other words there is assumed to be no ‘bounce-back’ (where returns on assets grow faster than the long run average following a period where returns were lower than average), but also no detrimental impact of the crisis on the long run return that can be expected from these assets.
Figure 2: A simple lifecycle model of consumption and saving

The crisis is further assumed not to have affected wages or hours. This would tend to understimate the extent to which individuals experienced a negative shock to their lifetime wealth, but it is argued in appendix A.1 that this assumption is not as at odds with the experience of older people in the recent recession as might be initially thought.

In the context of this simple lifecycle model, if an individual experiences an adverse shock to their expected lifetime wealth then they will have to respond to this in order to avoid violating the intertemporal budget constraint described in equation 1. There are many margins along which an individual could adjust in response. They may decide to take the hit on consumption, either reducing their planned consumption during retirement, their current consumption or both. If the individual is planning to leave a bequest they may not adjust their own consumption at all, they may just reduce the size of the bequest they are intending to leave. Finally individuals may decide to respond through their labour supply, either increasing the number of hours they work until retirement or perhaps by delaying the date at which they plan to retire (wages are assumed to be exogenous in this simple model so an individual cannot, for example, choose to move to a higher paying job).

In reality individuals are likely to respond along a combination of these margins, and the margins along which individuals adjust will be determined by their utility functions. Utility is not fully specified here, but is assumed to take the general form in equation 2. Period utility ($u$) is assumed to be adversely affected by participating in work $P_t = \{0,1\}$ and exhibit negative marginal returns to hours worked $h$ and positive but diminishing marginal returns to current consumption $C_t$ and intended bequest $B$.

$$U_t = \sum_{t=t}^{T} \beta^{t-t} u(P_t, hP_t, c_t, B)$$  (2)

Individuals’ preferences, as captured by their utility function, are crucial in determining how individuals adjust to their wealth losses. The effects are likely to be very heterogeneous, with some individuals preferring to adjust along different margins to other individuals. Also in reality not all margins of adjustment will be available to all individuals. Individuals may not
have the flexibility to increase their hours as they choose, and individuals, particularly those that already work full-time, may find it very costly to their utility to increase their hours further even if they could do so. Not all individuals intend to leave a bequest, and clearly for those not intending to leave one a reduction in it is not an available margin of adjustment.

This work focuses on investigating whether there is any evidence that older individuals responded to the wealth loss they experienced as a result of the financial crisis by changing their planned retirement age. What governs this response is how an individual’s disutility of participation for additional years compares to their utility loss from forgone consumption or a reduced bequest. Despite the fact that utility is not fully specified in this simple setup there are still some likely implications that can be considered. Individuals are more likely to adjust on the retirement margin when their disutility of participation is relatively low, and less likely to delay their retirement when their disutility of participation is relatively high. This suggests that, for example, those who are near their planned retirement age, who could have high psychological costs associated with delaying their retirement, are less likely to do so than those who are further from retirement. Also, it might be expected that individuals whose partner is younger than themselves have a lower disutility of extending their working life, and so be more likely to react to their wealth loss by delaying retirement, than those with partners older than themselves. This might be expected because there is evidence that suggests that individuals in couples prefer to retire not too far apart from one another, and that individuals are more likely to continue working at older ages if their partner is also working (see for example Crawford and Tetlow (2010)). This could imply that individuals with younger partners may not be so averse to delaying their retirement, since their partners are on average more likely to continue working at older ages if they are, compared to individuals with older partners whose partners may already be planning to retire sooner than they are.

For each individual, given their wealth loss from the crisis, it is possible to calculate how much they would have to alter their planned retirement age by in order to leave their hours, consumption and bequest unchanged. Full adjustment on the retirement margin requires a new retirement age $\hat{R}$ such that equation 1 still holds - in other words, such that the present discounted value of the additional labour income from working more years plus the change in pension wealth from retiring later cancels out the wealth lost, as in equation 3.

$$\sum_{t=R}^{\hat{R}} \left( \frac{1}{1+r} \right)^{t-t} w_t h + P^R - P^R = -\Delta A$$  \hspace{1cm} (3)$$

Such an adjustment is shown graphically in figure 3, which depicts the new retirement age and path of wealth accumulation that would leave consumption and bequest unchanged (again assuming constant consumption purely for graphical simplicity).
Figure 3: Change in retirement required to offset a wealth loss in a simple lifecycle model

The empirical approach taken to investigate the extent to which older individuals adjust on the retirement margin is to compare the actual change in the retirement plans of older individuals with the change in their retirement age that equation 3 indicates would be required for the retirement margin to account for all of the adjustment.

If the two were equal this would imply that individuals adjusted to the wealth shock fully on the retirement margin - they leave their hours of work, their current and future planned consumption and any planned bequest unchanged, and change their retirement age so that the wealth shock is exactly offset. If on the other hand there was no change in reported retirement plans despite wealth losses, that would imply that individuals do not react on the retirement margin and instead adjust by altering other aspects such as their current or planned future consumption. Finally if there is some positive change in reported retirement plans, but it is less than the estimated required change in retirement, this implies that individuals partially adjust on the retirement margin by delaying retirement a bit, but that they also adjust on other margins, such as reducing consumption.

There are clearly a number of assumptions tied up in this formulation of the simple lifecycle model and the shocks arising from the financial crisis. There are also two crucially important assumptions underlying the use of the financial crisis as a natural experiment to investigate to what extent older individuals react to wealth losses by delaying retirement. The first is that the financial crisis resulted in a shock to wealth, and that individuals did not anticipate the asset price changes that occurred over this period in advance. If individuals had anticipated these changes, and therefore anticipated (or even avoided) the subsequent wealth losses, then we would not expect to see any changes in their retirement plans after the financial crisis occurred. The second is that there were no other changes over this period that would have affected either individuals’ wealth holdings or their retirement plans. Otherwise estimated wealth losses will be of the wrong size (and therefore the response to the estimated wealth losses may be under or overestimated), or any changes in retirement plans found may be wrongly attributed to the wealth losses when in fact some other factor that changed was the true cause. Some support for these assumptions is discussed in appendix A.1.
3.2. Empirical approach

The aim of this work is to investigate whether, and to what extent, individuals responded to their wealth losses by changing their retirement plans. To do this we compare the actual change in the reported planned retirement age before and after the financial crisis with the estimated required change in retirement age as given by equation 3.

There are reasons to believe that the size of the retirement response may be very different not only across individuals with different characteristics, but also simply for different levels of the required change in retirement. If the required change in retirement for an individual is very small because they lost relatively little wealth, then they may be able to rebalance their budget constraint by reducing consumption over the rest of their lives by a relatively small amount. They may therefore not respond on retirement and adjust more on other margins, since the utility cost of a small fall in consumption may be small relative to the disutility of staying in work longer. By contrast someone with a relatively large wealth loss may have to delay their retirement in order to avoid a large fall in their consumption, and since they have to delay their retirement, they may choose to adjust largely on that margin (if for example, the decision to delay retirement at all was associated with a large fixed cost, but the marginal extra month by which retirement is delayed has a relatively small additional cost). Finally for some individuals the required delay in retirement might be so large as to be implausible - then individuals would have to adjust on multiple margins and would not be able to adjust solely on the retirement margin.

The aim is therefore to fit the model:

$$\Delta R_i = f(\Delta \tilde{R}_i) + \varepsilon_i \quad (4)$$

Where $\Delta R_i$ is the reported change in the planned retirement age, and $\Delta \tilde{R}_i$ is the estimated change in the retirement age required to rebalance the intertemporal budget constraint if only retirement is adjusted. If an individual responded entirely on the retirement margin then $f(\Delta \tilde{R}_i) = \Delta \tilde{R}_i$, while if none of the response to the wealth loss is through delayed retirement then $f(\Delta \tilde{R}_i) = 0$. As discussed above there is reason to believe that $f(\cdot)$ is in fact non-linear in $\Delta \tilde{R}_i$.

To account for the likely non-linear relationship between $\Delta R_i$ and $\Delta \tilde{R}_i$, a nonparametric approach is taken using local linear regression. This methodology was introduced by Cleveland (1979) and further developed by Cleveland and Devlin (1988). Local linear regression has the advantage that it is very flexible, and does not require the specification of a function $f(\Delta \tilde{R}_i)$ that will fit all of the data in the sample. For each estimated delay in retirement, say $\Delta \tilde{R}_0$, a weighted least squares linear regression is estimated using the subset of the sample that is ‘close’ to the point $\Delta \tilde{R}_0$. Observations in the sample are weighted according to their proximity to $\Delta \tilde{R}_0$, with those that are close receiving a high weight, and those further away receiving a low weight. In this work a biweight (quartic) function is used.

According to the formulation of the model in section 2, there should be no change in planned retirement age except as a result of wealth losses stemming from the crisis. In other words, the expected change in retirement age should be zero for those with no wealth.
shocks. This would suggest that the local linear regressions should be run without including a constant term. However in reality it may be that the age at which an individual plans to retire changes over time as they get older (that is, a drift in planned retirement age might be expected between over time, even if the absence of any wealth shock). It could also be the case that the financial crisis had other more general effects than the specific wealth losses experienced by individuals, such as to increase uncertainty about the future or increase risk aversion. Such effects may influence everyone similarly regardless of their actual wealth losses from the crisis and could cause a general delay in planned retirement ages. To account for these possibilities the local linear regressions are also run including a constant term to capture any such general trends.

As discussed in section 2, a crucial assumption for the model is that there are no shocks other than the wealth losses caused by the crisis that would have affected individuals over the time period in question. One possible such shock is a health shock, which could strongly affect when an individual is planning to retire. To account for the possibility of such an important shock, the local linear regressions are also run with and without controlling for a health shock.

4. Data

4.1. Data sources

For evidence on how older individuals may have been affected by the financial crisis use is made of the English Longitudinal Study of Aging (ELSA) - a longitudinal dataset, broadly representative of the over-50s household population of England. It began in 2002/3 with a sample of over 11,000 individuals and is conducted every two years, with periodic refreshment samples being added to maintain the representativeness of the sample.

ELSA is uniquely placed to provide the required data for a study on the effects of the financial crisis on older adults in England for two main reasons. The first is timing: the third wave of ELSA consisted of interviews conducted between May 2006 and August 2007, while the fourth wave consisted of interviews conducted between June 2008 and July 2009. Data are therefore now available on individuals interviewed both before the financial crisis, and during/after the financial crisis hit. This is illustrated in figure 4, which describes the distribution of ELSA interview dates and how this fits in with movements in the FTSE index in the UK.
The second reason is the wealth of information contained in the ELSA data. The ELSA survey collects a large amount of detail on the components of financial and housing wealth held by individuals and households. The survey also collects information on private pension scheme membership and sufficient detail on individuals’ private pension schemes to enable likely pension income to be estimated. The present discounted value of these pension income streams from retirement to death can then be estimated as a measure of private pension wealth. State pension wealth entitlements can also be estimated given the rules of the state pension system in the UK as legislated at the time of the survey. In addition to detailed data on wealth, the ELSA survey also collects a large quantity of information on demographics, labour market circumstances, subjective and objective measures of health, and individuals’ expectations about the future.

In addition to the ELSA data, supplementary data on asset price changes between 2006 and 2009 are used. A monthly FTSE all-share index is constructed to capture aggregate fluctuations in the stock market - this is based on the average daily closing value of the FTSE all-share index in each month, taken from Yahoo!Finance. To capture aggregate house price fluctuations the Land Registry monthly regional house price indices and the England and Wales average house price index are used. These use sales data collected on all residential housing transactions in England (and Wales) to calculate indices based on repeat sales of property. Finally, to capture aggregate fluctuations in DC pension funds the FTSE PensionsDecision Index is used. This is an index of total fund return (in other words it assumes that any dividends are re-invested) that reflects the asset allocation decisions made by leading DC pension plans in their default investment strategies.

For this analysis investigating the effect of the financial crisis on retirement timing, the analysis is restricted to the sample of individuals who were employees and aged below the State Pension Age in the 2006/7 data. This results in a baseline sample of 1,925 individuals.
4.2. Variable creation

To estimate the required change in retirement plans described in equation 3, knowledge of wages (now and in the future), hours worked, pension wealth (given any retirement age), the wealth shock and the pre-crisis planned retirement age are required for each individual. These are discussed in turn below.

Hourly wages are calculated using weekly earnings and hours worked which are both reported in the ELSA data\(^1\). Where the resulting reported hourly wage was less than the minimum wage the individual was assumed to get the minimum wage. To check the validity of the self reported data the resulting distributions of hourly wages and hours worked are compared to those from an alternative data source, the Annual Survey of Hours and Earnings, in appendix A.2. Hours worked are assumed to be constant over time.\(^2\) Wages are assumed to grow at a nominal 5% pa for those aged under 55, and a nominal 2.5% pa for those aged 55 and over.\(^3\)

Pension wealth is estimated for each individual using the information contained in the 2006/7 ELSA data. Pension wealth from both private and state pensions is estimated, and is estimated on the basis of each possible year of retirement. State pension wealth is estimated based on the rules of the UK state pension system (as it existed prior to the 2007 Pensions Act) and the estimated labour market participation and earnings of the individual. Private pension wealth is calculated as the present discounted value of the stream of pension income that an individual can expect to receive in retirement. This pension income is calculated for any and all private current or retained pensions that an individual has, based on reported earnings, tenure and scheme rules for defined benefit schemes, or accrued fund value, contributions made and annuity rates for defined contribution (DC) pension schemes. For pensions that are already in receipt, future income is estimated using reported current income and rules on benefit uprating. These very involved calculations broadly follow the methodology set out by Banks, Emmerson and Tetlow (2005) that was used to calculate pension wealth for the 2002/3 ELSA sample. That paper can therefore be referred to for much more specific details on how pension wealth was estimated.

The wealth shock individuals experienced as a result of the crisis is estimated based on individuals’ holdings of ‘exposed’ assets in 2006/7 and the change in the price of those assets relative to expectations between an individual’s two interview dates. Exposed assets are taken to be investments (non-cash ISAs, life insurance products, bonds, shares, PEPs, trusts and national savings products), property wealth (owner-occupied housing and any

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\(^1\) Weekly earnings are taken from the ELSA derived dataset and are imputed where this information is missing. For more information see Nunn, S. et al (2008).

\(^2\) This is likely to be an upper estimate of hours since many older individuals choose to reduce their hours as they approach retirement.

\(^3\) Banks, Emmerson and Tetlow (2007) considered ELSA panel data and concluded that real earnings growth of 2.5% for 50-54 year olds and 0% for those aged 55 and over was appropriate.
other property wealth) and unannuitised DC pension wealth. The change in the price of assets is given by the difference between what the price of the assets was expected to change by and what the relevant asset price index actually changed by. The asset price indices used were: the FTSE all share index for investments, the FTSE PensionDCisions Index for unannuitised DC pension wealth, regional house price indices for owner-occupied housing wealth, and the England and Wales average house price index for other property wealth. Equation 5 therefore represents the simulated wealth loss relative to assumed expectations.

\[
\Delta A_i = \text{investments}_i(\Delta \text{FTSE}_{AS}^e - \Delta \text{FTSE}_{AS}) + \text{house}_i(\Delta r \text{HPindex}^e - \Delta r \text{HPindex}_i) + \text{property}_i(\Delta \text{avHPindex}^e - \Delta \text{avHPindex}) + \text{DFfund}_i(\Delta \text{FTSE}_{DC}^e - \Delta \text{FTSE}_{DC})
\]

(5)

Individuals are assumed to have expected all assets to grow by 5% a year in nominal terms. This is the lowest of the Financial Standards Authority’s standard projection rates for the return on investment products. This relatively conservative estimate for the expected return on assets is likely to be more appropriate for older individuals approaching retirement, since individuals typically engage in ‘lifestyling’ - that is, moving out of investments with relatively high returns but also relatively high risk, towards safer assets with lower rates of return as they approach retirement. A nominal growth rate of 5% also seems a sensible assumption for house price expectations. Nationwide (2008) estimated that the long-run trend growth in real house prices in the UK has been around 2.7% a year.

Figure 5 shows the distribution of the changes in asset prices relative to expectations for the individuals in the ELSA sample for the different types of assets. The distribution of the FTSE all-share and FTSE PensionDCisions price changes arise from the distribution of ELSA interview dates in 2006/7 and 2008/9, while the distribution of house price changes arises from both the distribution of interview dates and the distribution of region of residence.

**Figure 5: Distribution of changes in asset prices (relative to expectations) in the ELSA sample**
The intention of the ELSA survey design is that individuals were interviewed at roughly the same point of time in each wave, but that the initial distribution of individuals across interview dates in 2002/3 (or in 2006/7 for the refreshment sample) was random. This randomness of interview date gives some plausible exogeneity to the asset price changes, and therefore to the wealth shocks, that individuals will have experienced when they are interviewed in 2008/9. This is a big advantage over relying solely on the different portfolio choices to result in different wealth shocks since the role of preferences in determining both initial portfolio choices and the response to wealth shocks would likely cause an endogeneity problem.

The inclusion of housing wealth as a source of resources from which to fund retirement consumption often causes some consternation. Anecdotal evidence in the UK suggests that individuals do not think of housing wealth in the same way as other forms of wealth, and do not intend to draw down their housing wealth in order to fund consumption in retirement. Instead it is often argued that individuals plan to stay as owner-occupiers in their homes until they die, at which point they bequeath them to their children. Such mental accounting, where certain resources are associated with particular spending plans, would suggest that retirement decisions would not be expected to be influenced by housing wealth changes, only by changes in the types of wealth that are intended to be used to fund retirement consumption such as pensions and financial assets. This is explored in more detail in appendix B.2, which produces results akin to those in section 5 but where the wealth losses from different components of wealth are considered separately.

Wealth data in ELSA is often collected at the household or benefit unit level since in many cases it is hard to divide assets between the individuals in that unit. This analysis therefore assumes that all wealth held in a couple is shared equally, so that each individual is ‘responsible’ for half of the benefit unit wealth, and receives a shock equal to half of the total shock hitting the couple. It is also assumed for calculating the required change in retirement age that each individual is responsible for restoring their half of the wealth lost.

The pre-crisis planned retirement age is taken to be the individual’s answer to the self-completion (SC) questionnaire question “At what age would you like to retire?” This is clearly not the same as the age at which an individual may be planning to retire - an individual may want to retire at 55 but know he will not be able to afford to do so until he is 65. However this analysis is going to proceed by assuming that individuals interpret this in such a constrained way, and report the age at which they are planning to retire. The distributions of the answers to this question, shown in figure 6, suggest that this is not an unreasonable assumption.

To control for health shocks, the change in the individual’s self reported probability that their health will limit their ability to do paid work before they reach age 65 between 2006/7 and 2008/9 is used.
4.3. Outcome variables

The main outcome that will be considered is the change in the reported answer to the SC question “At what age would you like to retire?” This will be interpreted directly as a change in the individual’s planned retirement age. A second question that is of interest comes from the core ELSA interview, and asks individuals aged under the SPA what the chance is that they will be working after they reach a certain age. The age asked about depends on the sex and current age of the respondent: women aged 50-54 are asked about probability of work after age 55, women aged 55-59 are asked about after age 60, men aged 50-59 are asked about their chance of working after age 60, while men aged 60-64 are asked about after age 65. The change in the answer to this question (for those individuals for whom the age at which they were asked about does not change between 2006/7 and 2008/9) will be considered as a second outcome that is indicative of changes to retirement plans - an increase in the probability of working at a certain age in future is likely to be reported if an individual has delayed their planned retirement age. While harder to interpret than the main outcome, it provides a useful check on the first question’s answers. If individuals answer the SC question literally as the age at which they would like to retire, rather than the age at which they are planning to retire, then we would probably expect to find no change in the main outcome as a result of the financial crisis. However in that case we would still expect to find some change in the probability of work, as captured in the secondary outcome.

The distribution of changes in the reported planned retirement age and change of working in future are shown in figures 7 and 8 respectively. Given these distributions it perhaps seems unlikely that retirement date will prove to be a margin of adjustment used by many individuals. While around a quarter of individuals increased their reported planned retirement age between 2006/7 and 2008/9, just over half of individuals did not change their reported retirement age and 13% of individuals actually reduced it. The distribution of changes in the chance of working in future also looks surprisingly symmetric. While 40% of
For individuals to be included in the bulk of this analysis they are required to answer question the SC question on retirement age in both 2006/7 and 2008/9. This has two significant disadvantages. First, coming from the self-completion questionnaire rather than

Figure 7: Distribution of change in reported retirement age

![Distribution of change in reported retirement age](image)

Change in reported planned retirement age between 2006/7 and 2008/9 (years)

Figure 8: Distribution of change in chance of working in future

![Distribution of change in chance of working in future](image)

Percentage point change in expected probability of working past age X in future (between 2006/7 and 2008/9)
the core interview, not all individuals respond - the sample size for this outcome is reduced to 1,196. This non-response is unlikely to be random - the most important explanatory factor affecting selection into response is whether or not the respondent is part of a couple. Individuals in couples completed the SC questionnaire during the main interview while their partner was answering individual questions with the interviewer, while single individuals were left the SC questionnaire to complete and return by post. To account for this the data is weighted using the ‘self-completion’ weights provided in the 2008/9 ELSA data that aim to adjust for differential non-response amongst the 2008/9 ELSA respondents.

The second potential problem is that this question is only asked of those who report that they are currently in work. This means that those who left work between 2006/7 and 2008/9 do not get the opportunity to report a change in their planned retirement age, and the analysis for this outcome is therefore based on the somewhat selective sample of those who were in work in both 2006/7 and 2008/9. So long as this movement out of work was random this would not present too much of a problem. However those who planned in 2006/7 to retire within the next two years and did not change these plans between 2006/7 and 2008/9 will not then be represented in the data for this outcome, while those who planned to retire in the next two years but delayed that so that they were still in work in 2008/9 will be. This implies that the data may slightly overstate the extent to which individuals delayed their retirement since some of those who did not will not be included in the sample. In reality about half of those who were planning to retire within 2 years in 2006/7 did so, while about half were still in work in 2008/9. As a proportion of the total sample, those who retired ‘as planned’ and are consequently excluded from the main outcome account for around 3% of the total sample. Therefore while the sample selection issues should be borne in mind, it is not thought that they will have a major bearing on the results.

The secondary question about expectations of work in future is asked of all individuals aged under the State Pension Age and therefore does not have the sample selection issues. This is another reason why this question, though also far from perfect, provides a useful check on the results from the main outcome variable.

5. Results

5.1. Descriptive analysis

The vulnerability of older individuals to the financial crisis will depend on what wealth these individuals had and how exposed it was to the asset price changes that occurred over this period. Table 1 describes average wealth holding in the ELSA sample, disaggregated according to type of wealth.

The most important component of wealth was private pension wealth, which accounted for 35% of wealth holdings. However only just over half of individuals were members of households that held wealth in DC pensions that was potentially exposed to movements in the stock market. The second most important component of wealth was property wealth, held by some 90% of the sample and accounting for a third of gross wealth. This was primarily owner-occupied housing. Social security was also relatively important, contributing around one fifth of wealth across the sample, and with all of the sample entitled to some
state pension. Financial assets in the form of savings and investments together contributed around 9% of gross wealth, with almost all of the sample holding some assets in savings and two thirds of individuals being members of households that held some investments. Debts among the ELSA sample are relatively low, as is typical among older individuals, with mortgage debts equal to just over 2% of gross wealth, and average non-mortgage debts being negligible.

Table 1: Average wealth holdings among the ELSA sample

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>% gross wealth</th>
<th>Proportion in households with</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total gross wealth</strong></td>
<td>£413,096</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investments</td>
<td>£19,647</td>
<td>4.8%</td>
<td>74.5%</td>
</tr>
<tr>
<td>DC pensions</td>
<td>£39,895</td>
<td>9.7%</td>
<td>57.4%</td>
</tr>
<tr>
<td><strong>Property wealth</strong></td>
<td>£138,393</td>
<td>33.5%</td>
<td>90.4%</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary housing wealth</td>
<td>£127,647</td>
<td>30.9%</td>
<td>89.8%</td>
</tr>
<tr>
<td>Other housing wealth</td>
<td>£10,745</td>
<td>2.6%</td>
<td>14.4%</td>
</tr>
<tr>
<td><strong>Safe' wealth</strong></td>
<td>£215,163</td>
<td>52.1%</td>
<td>100.0%</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State pension wealth</td>
<td>£83,696</td>
<td>20.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Private pension wealth</td>
<td>£105,484</td>
<td>25.5%</td>
<td>75.5%</td>
</tr>
<tr>
<td>Savings</td>
<td>£16,380</td>
<td>4.0%</td>
<td>94.4%</td>
</tr>
<tr>
<td>Physical wealth</td>
<td>£9,603</td>
<td>2.3%</td>
<td>16.7%</td>
</tr>
<tr>
<td><strong>Debts</strong></td>
<td>£11,652</td>
<td>2.8%</td>
<td>60.6%</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortgage debts</td>
<td>£9,817</td>
<td>2.4%</td>
<td>42.9%</td>
</tr>
<tr>
<td>Non mortgage debts</td>
<td>£1,835</td>
<td>0.4%</td>
<td>46.6%</td>
</tr>
<tr>
<td><strong>Total net wealth</strong></td>
<td>£401,444</td>
<td>97.2%</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 'Safe' private pension wealth includes defined benefit (DB) pensions and pensions already in receipt. Sample size: 1,925 individuals.

The main source of exposure of older individuals to the crisis was therefore through property wealth, which most households held and which on average accounted for a large proportion of wealth. Most individuals will also have been exposed to asset price changes through either investments or their DC pensions, but average wealth holdings of these types were relatively small so exposure will have been more limited than perhaps first expected.

The simulated changes in wealth, relative to what might have been expected, are calculated according to equation 5 and the distribution of these changes is shown in figure 9. Virtually no one is simulated to have gained more wealth between 2006/7 and 2008/9 than they are assumed to have expected. Over half of the sample is simulated to have experienced a loss
in their financial wealth relative to what they would have expected to have (unsurprising given that the change in the FTSE index was a fall for everyone as shown in figure 5). These simulated declines are quite small however - only about 16% of individuals are simulated to have lost more than 2% of their gross wealth, 6% more than 5% of their gross wealth. Although the decline in the FTSE index was large, individuals typically hold a small proportion of their wealth in risky financial assets.

**Figure 9: Distribution of simulated changes in wealth relative to expectations**

The distribution of losses from DC pension wealth is similar to that of losses from financial wealth, though on average the losses were slightly larger. Although the FTSE PensionsDCisions index performed better over the period than the FTSE all-share index, individuals tend to hold more wealth in DC pensions than they do in investments and so their losses as a proportion of total gross wealth are greater from their DC pensions.

In terms of property wealth, again virtually no individual was simulated to have achieved the 5% a year nominal growth that they were assumed to be expecting. The losses to gross wealth from property wealth are more significant than the losses to FTSE and DC wealth because of the large proportion of wealth held in property wealth. 45% of the sample are simulated to have lost up to 5% of their gross wealth through changes to their property wealth, while some 40% are simulated to have lost more than 5%.

In terms of total wealth losses, the sum of simulated losses from risky financial wealth, housing wealth and DC pension wealth, over 90% of individuals are simulated to have experienced some loss in their wealth relative to what they are assumed to have been expecting. Some 60% are simulated to have lost more than 5% of their gross wealth, and nearly a third more than 10%.

Given the simulated wealth losses, for each individual the delay in their retirement age that would be required to offset this loss while leaving hours, consumption and bequests unchanged is calculated according to equation 3. The distribution of these required delays is
shown in figure 10. The median required delay in retirement is 1.1 years, while the mean is 3.5 years. These are somewhat larger adjustments than were estimated to be required by McFall (2010) in the US, where the median increase was 0.6 years and the mean 2.9 years. In the ELSA sample 10% of individuals are estimated to need to delay their retirement by more than 10 years in order to adjust to their wealth loss entirely on the retirement margin. These individuals tend to be those who are simulated to have lost large amounts of wealth, or who earn relatively low hourly wages or who work few hours.

Figure 10: Distribution of estimated required delay in retirement

5.2. Local linear regression analysis

The aim of this work was to investigate to what extent individuals responded to their wealth losses from the financial crisis by changing their retirement plans. This section presents the results from the nonparametric analysis of changes in retirement plans given the estimated change that would be required for all of the adjustment to take place on the retirement margin.

Figure 11 presents results from the local linear regression analysis in which the change in reported planned retirement age is compared to the estimated required change in the retirement age. Panel A presents the predicted change in planned retirement age across the distribution of estimated required changes, while panel B presents the coefficient on the required change from the local linear regression. It is immediately clear that individuals do not typically adjust to their wealth losses entirely on the retirement margin, and the extent to which this margin is used depends upon the delay in retirement that would be required. On average those who need to delay their retirement by half a year are estimated to delay their retirement by half that amount, while those who need to delay their retirement by 3 years are estimated to delay their retirement by around a quarter of that amount.
Figure 11: Relationship between change in planned retirement age and estimated required change

Notes: Sample size: 1,196. Dashed lines represent the 25th, 50th and 75th percentiles of the distribution of estimated required delays in retirement. Panel A: predicted delay in retirement is the predicted ∆R from the local linear regression. Panel B: Coefficient is $\beta$ from the local linear regression $\Delta R = \beta \Delta \hat{R} + \varepsilon$. Dotted lines describe the 95% confidence interval around $\beta$.

As discussed in section 3.1 however, the estimated required change in retirement derived solely from an individual's simulated wealth loss may not in reality capture all of the changes in the individual's circumstances between 2006/7 and 2008/9 that are relevant to the retirement choice. Controlling for health shocks in the local linear regression makes little difference to the picture in figure 11, but including a constant term does change the picture. Figure 12 presents the results from the local linear regression analysis when a constant and control for health shocks are included. Including a constant term increases the predicted change in planned retirement age to a roughly constant 0.7 years over the bottom two thirds of the distribution of estimated required delay. Individuals do not seem to be adjusting to their wealth losses by altering their retirement plans - panel B shows that the coefficient on the required change in retirement is not significantly different from zero across the vast majority of the distribution. It instead appears that there is a general trend for individuals to delay their planned retirement. This could be the result of a number of factors: first, individuals could tend to increase their retirement plans as they age. Second, sample selection issues mean there is a slight bias toward finding delayed retirement on average. Finally, the financial crisis could have had general effects that tended to make individuals delay their retirement irrespective of their own specific wealth losses, for example by increasing uncertainty or increasing risk aversion. However it is not felt that this latter reason is the most likely explanation since comparisons of previous consecutive waves of ELSA data also appear to indicate a slight delay in retirement plans on average.
Figure 12: Relationship between change in planned retirement age and estimated required change, controlling for health shocks and trend

Notes: Sample size: 1,196. Dashed lines represent the 25th, 50th and 75th percentiles of the distribution of estimated required delays in retirement. Panel A: predicted delay in retirement is the predicted $\Delta R$ from the local linear regression. Panel B: Coefficient is $\beta$ from the local linear regression $\Delta R = \alpha + \beta \Delta R + \gamma H + \epsilon$. Dotted lines describe the 95% confidence interval around $\beta$.

Panel B of figure 12 indicates that the estimated required delay in retirement becomes closer to having a significant positive effect for individuals who require a relatively large delay in their retirement. This could be indicative that delaying retirement is an adjustment of last resort - that individuals will only change their retirement plans if their wealth losses are significant enough that they could not be comfortably offset by adjusting other margins. However given the scarcity of the data at this end of the distribution for estimated required delays this cannot be said with any degree of certainty.

As was discussed in section 4, the finding that changes in planned retirement age are not correlated with the estimated required delays would be expected if individuals were reporting the age at which they would like to retire, rather than the age at which they are actually planning to retire. To test this, an alternative outcome is used - the change in the individual's self reported expectation of being in work in future - and the relationship between this and the estimated required delay in retirement is explored. Figures 13 and 14 present the results of the nonparametric analysis, without and with controls for health shocks and a constant trend respectively. When it is assumed that there is no general change to expectations over time, figure 13 indicates that individuals do seem to adjust their future work expectations in response to wealth losses. The magnitude of the effect is fairly small though - a wealth loss that would require a delay in retirement of 2 years on average only results in an increase in the probability of working in future of about 2.6 percentage points. Once a general change in expectations over time is allowed for (figure 14) the required delay in retirement no longer appears to have a significant association with the reported change in expectations. It is worth noting that although this outcome does not suffer from the same sample selection problems as the primary outcome, there is still predicted to be an increase in the expected probability of work in future between 2006/7 and 2008/9 in the absence of wealth shocks. This gives support to the idea that there is a general trend for individuals to delay their retirement plans as they get older, and that the
average delay in retirement found from the primary outcome variable is not simply the result of sample selection bias.

**Figure 13: Relationship between change in expectation of working in future and estimated required retirement delay**

Notes: Sample size: 1,267. Dashed lines represent the 25th, 50th and 75th percentiles of the distribution of estimated required delays in retirement. Panel A: predicted change in the probability of work at age $X$ in future is the predicted $\Delta E(P)$ from the local linear regression. Panel B: Coefficient is $\beta$ from the local linear regression $\Delta E(P) = \beta \Delta R + \epsilon$. Dotted lines describe the 95% confidence interval around $\beta$.

**Figure 13: Relationship between change in expectation of working in future and estimated required retirement delay, controlling for health shocks and trend**

Notes: Sample size: 1,267. Dashed lines represent the 25th, 50th and 75th percentiles of the distribution of estimated required delays in retirement. Panel A: predicted change in the probability of work at age $X$ in future is the predicted $\Delta E(P)$ from the local linear regression. Panel B: Coefficient is $\beta$ from the local linear regression $\Delta E(P) = \alpha + \beta \Delta R + \gamma \Delta H + \epsilon$. Dotted lines describe the 95% confidence interval around $\beta$.

Overall it appears that individuals do not typically adjust to the wealth losses they experienced as a result of the financial crisis by changing their planned retirement age. However, as discussed in section 3.1, individuals are likely to differ in terms of the margins on which they choose to react, and this absence of a retirement response in aggregate could be hiding some marked heterogeneity among different groups of individuals. To consider this the analysis is run separately for subgroups that are thought perhaps more likely to respond by altering their retirement plans (because they have a relatively low disutility of participation).
One subgroup split considered is those who are ‘close’ to their planned retirement age (defined as within 5 years of the age at which they would like to retire) compared to those who are ‘not close’. As discussed in section 3.1, it is possible that those who are close to retirement have higher costs, particularly psychological costs, of changing their retirement age and so they are more likely to adjust on margins other than retirement than those who are further away from retirement. Figures 15 and 16 present the analysis for those ‘close’ and ‘not close’ to retirement respectively, in both cases allowing for an underlying change in retirement plans over time and controlling for health shocks.

**Figure 15: Relationship between change in planned retirement age and estimated required change, controlling for health shocks and trend: those close to retirement**

Notes: As figure 12. Sample size: 525.

**Figure 16: Relationship between change in planned retirement age and estimated required change, controlling for health shocks and trend: those not close to retirement**

Notes: As Figure 12. Sample size: 671.

Surprisingly there is little association between the need to delay retirement and the change in reported planned retirement age for either group. The exception seems to be for those who are not close to retirement and who would need a relatively large delay in their retirement to offset their wealth losses. This is consistent with the idea of delayed retirement being an ‘adjustment of last resort’ for those for whom the psychological costs of delaying retirement are perhaps lower. However since the data not particularly dense in this part of the distribution this result should be taken as suggestive rather than definitive. It is
also interesting to note the difference between the predicted changes in retirement age for those ‘close’ and ‘not close’ to retirement. Those ‘close’ to retirement are generally estimated to increase their planned retirement age by nearly 2 years between 2006/7 and 2008/9, while those who were ‘not close’ are not typically estimated to increase their retirement age in the absence of large wealth shocks. This implies that the underlying trend of increasing planned retirement age over time stems from those approaching retirement postponing that point, rather than a general change in expectations across everyone. However it should also be borne in mind that sample selection issues will tend to bias the outcome for the group who are 'close' to retirement towards a delay in retirement.

A final division of the sample that is considered here to investigate heterogeneous responses is between individuals who have a younger partner and individuals with an older partner. It was described in section 3.2 that it might be expected that those with a younger partner have a lower cost of participation in work at older ages and therefore they might by more likely to react to any wealth losses by postponing their retirement. Figures 17 and 18 present the results of the local linear regression analysis for individuals with younger and older partners respectively, and in fact the picture looks remarkably similar for both groups. Neither group appears to have exhibited a change in their reported retirement age that was associated with their estimated required delay in retirement.

**Figure 17: Relationship between change in planned retirement age and estimated required change, controlling for health shocks and trend: those with a younger partner**

![Figure 17](image)

Notes: As Figure 12. Sample size: 594.

A potential problem with the subgroup analysis presented here is that the sample sizes start to become rather small and the uncertainty around the local linear regression estimates increases. This would make it harder to identify a significant effect even if one were to exist. However appendix B.1 contains the results of ordinary least squares regressions where greater structure is imposed on the subgroup analysis, and this does not reveal any significant results that the local linear regression was unable to pick up.
Figure 18: Relationship between change in planned retirement age and estimated required change, controlling for health shocks and trend: those with an older partner

Notes: As Figure 12. Sample size: 456.

As discussed in section 4.2, a mental accounts approach would suggest that individuals respond differently to losses from different types of wealth. Appendix B.2 presents some results where losses from housing wealth and non-housing wealth are considered separately, but the distributions of losses from different types of wealth are too limited to draw any firm conclusions.

7. Conclusions

The recent financial crisis is likely to have resulted in a negative shock to the wealth holdings of most individuals in the UK. Those approaching retirement will have been particularly vulnerable to these price changes, since they hold relatively large amounts of wealth and have little time left to react before their planned retirement date. Using ELSA data on wealth holdings before the crisis, and changes in asset prices over the course of the crisis, it is simulated that around 60% of employees aged between 50 and the state pension age will have lost more than 10% of their gross wealth.

A simple lifecycle model would suggest that in response to a negative wealth shock, individuals must either reduce their consumption, reduce their planned bequest, increase the hours they work, or delay their retirement. For the ELSA sample it is calculated that the median individual would have to delay their retirement by 1.1 years if they were to leave consumption, bequests and hours worked unchanged, while the mean required delay is retirement is 3.5 years.

Nonparametric estimation of the association between actual changes in reported planned retirement ages between 2006/7 and 2008/9 and the delay that is estimated to be required if consumption, bequests and hours are to be left unaltered suggests that delaying retirement is not the usual margin of adjustment. Even for those subgroups who might be thought more likely to adjust through their retirement age, those further from retirement and those with younger partners, the size of the estimated required delay did not seem to have a significant effect on the actual reported change in retirement plans.
Only for those with wealth losses that result in a relatively large required delay, of over 4 years, did the required delay seem to have a significant effect. This could suggest that the retirement margin is a ‘margin of last resort’ and that individuals will only delay their retirement if the wealth loss is too large to be comfortably borne on other margins. However the data are too scarce at this end of the required delay distribution to be able to claim this result with any certainty.

There are caveats to the approach taken in this work that could mean that evidence of wealth effects on retirement age has not been found when such an effect does exist. The most significant weakness is probably the interpretation of the answer to “At what age would you like to retire?” as the respondent’s planned retirement age. However the alternative, harder to interpret but less problematic, question concerning the chance of work in future is also used with little change in the results. There is also the potential problem created by conditions in the demand side of the labour market - a lack of available jobs may affect individuals’ answers to questions about their labour market plans, which will not therefore reflect only their supply side intentions. This concern is mitigated by two factors: first, the questions used as outcomes in this work are forward looking and individuals are likely to expect labour market prospects to improve. Second, the individuals in this sample are in employment in both 2006/7 and 2008/9, and are therefore presumably less affected by weak labour demand than other individuals. Finally, the simple model used in this work assumes that asset prices do not ‘bounce back’. If individuals are expecting asset prices to increase faster than average during the recovery from the crisis then this work may overstate the wealth losses individuals have experienced and therefore the adjustments they would need to make. However anecdotal evidence suggests that this is not what individuals in the UK expect.

Despite these caveats it seems more likely that the findings of this work are a genuine indication that older individuals in England have not in general responded to the wealth losses they experienced as a result of the crisis by changing their retirement plans. There are two broad reasons why this could be the case. It could be that individuals have adjusted to their wealth losses through margins other than retirement. The results suggest that retirement timing may be an adjustment of last resort, and that most individuals did not experience sufficient wealth losses from the recent crisis for it to be required. This is consistent with the findings of Crossley, Low and O’Dea (2011) of consumption adjustments and Banks, Crawford, Crossley and Emmerson (2011) of bequest adjustments, though neither of these papers attempts to estimate whether the response on these margins is sufficient to entirely offset the likely wealth loss experienced. An alternative reason for no retirement adjustment could be that individuals are simply not yet aware of the effect that the recent asset price changes have had on the feasibility of their previous retirement plans, and in fact adjustment on all margins has not yet been sufficient to offset the wealth losses that individuals have experienced. This would also be consistent with the suggestive evidence that only those with a relatively large required delay have increased their planned retirement age. These individuals can perhaps be expected to be more likely to realise that their previous plans are no longer feasible.
There is therefore much scope for further work to investigate both other potential margins of adjustment and the more long run effects of the financial crisis on expectations and indeed actual behaviour, in order to better explain the apparent absence of a retirement response.
References


Appendices

A. Data issues

A.1. Plausibility of the underlying assumptions

An important assumption made when estimating the effects of the financial crisis on lifetime wealth is that the crisis only affected wealth holdings, and had no effect on an individual's hours or wages. This is clearly not the case: the financial crisis was associated with the deepest recession in the UK since the 1930s, and it is unreasonable to think that there was no adverse affect on the hours and/or wages of those who managed to remain in employment over this period. However recent empirical data suggests that this might not be such a problem as anecdotal evidence would suggest. Gregg and Wadsworth (2010) suggest that average hours fell by only around 2%. Data from the Annual Survey of Hours and Earnings indicates that median hours among those aged over 50 was virtually unchanged over the period, while mean hours fell from 34.1 to 33.6 between 2006 and 2009 for those aged 50-59, and from 29.8 to 29.3 for those aged over 60. What decline there was in average hours seems to have come more from the younger part of the population, particularly those aged 18-21. A similar story can be told for pay. Figure 19 shows the median total hourly pay between 2006 and 2010. There is actually surprisingly little decline in the growth of median pay before 2010, and again the early declines are most notable for the younger groups, particular those aged 18-21. So while the assumption that the financial crisis affected only asset holdings may initially seem restrictive, there is evidence to suggest that it is not that bad a simplifying assumption for the older adults of interest in this work.

Figure 19: Median total hourly pay 2006 to 2010, by age

As discussed in section 3.1 there are also two key assumptions underlying the use of the recent financial crisis as a natural experiment to investigate to what extent older individuals react to wealth losses by delaying their retirement. The first is that individuals did not anticipate the asset price changes that occurred. Some justification for this assumption can be drawn from the responses to a question in the ELSA survey about house price expectations. Individuals were asked (randomly) one out of a set of 4 questions that asked
what their expectation was that their house value would [increase/decrease] by over [5/10]% over the next year. Across the subsample of ELSA respondents considered here who were interviewed in 2007, the mean expectation of more than a 5% increase was 61%, while for more than a 10% increase was nearly 40%. By contrast the mean expectations of more than a 5% or 10% fall were both less than 20%. Admittedly the financial crisis hit slightly more than a year after the majority of these individuals were interviewed, but these are still not particularly pessimistic expectations, and seem no more pessimistic than expectations reported in the 2004/5 or 2002/3 ELSA surveys, as would be expected to be the case if individuals were expecting the impending financial crisis.

The second is the assumption that there were no other changes over this period that would have affected either wealth holdings or individuals’ planned retirement ages. One concern that should be addressed regarding this is the reforms to the UK state pension system contained in the 2007 Pensions Act. This reduced the requirements to qualify for a full Basic State Pension in the UK and so will have increased the present discounted value of state pension wealth for some individuals. This is not felt to be a concern here, and indeed is not even included in the simulated shock to wealth. The main reason for this is the belief that for each individual either one of two things applies. Either they were aware of the state pension reforms in 2006/7 even though the Act had not yet been passed, and had therefore already factored that into their retirement plans at that stage, or they were still unaware of the reforms by 2008/9 and so had not changed their retirement plans as a result of the Pensions Act being passed. While this may seem an assumption for convenience it is actually highly plausible. The reforms contained in the Pensions Act were proposed in 2003, so those aware of such matters were likely to have expected the reforms before 2006. Those who were unaware of the reforms by then are unlikely to have become aware of them simply because of the passing of the Pensions Act. Previous work using the ELSA data has found that awareness of state pension reforms is fairly low. Crawford and Tetlow (2010) show that in 2006/7 only 1/3 of women affected by changes to the female State Pension Age that started to be implemented from 2010 were aware of this, despite the changes being legislated some 10 years previously.

**A.2. Consistency of wages and hours reported in the ELSA data**

The estimation of the required delay in retirement according to equation 3 is very dependent on what future labour income is calculated to be. This is calculated for each individual using wages and hours reported in the 2006/7 ELSA data. Since this data is self reported it sensible to test how valid the answers appear, as this could have a strong bearing on the resulting required retirement delays estimated. Figures 20 and 21 compare the distribution of reported hours and pay in the ELSA data to official results published from the Annual Survey of Hours and Earnings (ASHE). ASHE is an employer based survey, based on a 1% sample of UK employees, that is widely accepted as the most reliable and complete survey of hours and earnings of employees in the UK. The distribution of hours reported in ELSA looks almost identical to that of the ASHE data for older individuals. The only real difference appears at the very top of the distribution where a greater proportion of people
report working very long hours in the ELSA data than do in the ASHE data. The distributions of reported pay between the two datasets however do look somewhat different, with ELSA respondents tending to report lower pay than would be expected given the distribution in the ASHE data. The median hourly pay in ELSA is only around £7.50, compared to £10.75 (£10) for those aged 50-59 (men aged 60+) in the ASHE data. This could indicate that pay is underreported in the ELSA data, which would mean that the estimated required delays in retirement are a slight overestimate.

Figure 20: Checking validity of the hours reported by ELSA respondents

Figure 20: Checking validity of the pay reported by ELSA respondents

Note: Hourly pay in the ELSA data is calculated by dividing derived weekly pay by the reported number of hours worked.
B. Supplementary Results

B.1. Further sub-group analysis

A potential problem with conducting local linear regression analysis on subgroups is that the sample sizes are too small for significant results to be found. To address this, regression analysis that imposes greater structure is conducted. The sample is restricted to those who are estimated to require less than a five year delay in their retirement (to avoid the results being unduly influenced by the small number of people with very high estimated required delays). Ordinary least squares regression analysis is performed, regressing the reported delay in planned retirement on the square and the cubic of the estimated required delay in retirement, allowing for a differential effect by subgroup. These functional forms are used since the local linear regression analysis suggests that the function \( f(\Delta \tilde{R}) \) in equation 4 could be reasonably approximated by these forms over this part of the distribution of \( \Delta \tilde{R} \).

The results of this analysis are shown in table 2. The coefficients on the \( (\Delta \tilde{R})^x \) terms and (where applicable) their interactions were not jointly significantly different from zero. Imposing greater structure on the analysis therefore did not identify any significant relationship between the change in the reported retirement age and the estimated required delay in retirement that the local linear regression analysis failed to pick up.

<table>
<thead>
<tr>
<th>Table 2: Subgroup analysis: OLS regressions</th>
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<tr>
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<tr>
<td>( \Delta \tilde{R} )</td>
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<td>All D</td>
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<td>By proximity to retirement</td>
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<tr>
<td>(0.250) (0.454) (0.315) (0.577) (0.395) (0.771)</td>
</tr>
<tr>
<td>(0.270) (0.247) (0.095) (0.091) (0.056) (0.741)</td>
</tr>
<tr>
<td>(0.060) (0.355) (0.030) (0.132)</td>
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<tr>
<td>(0.042) (0.054) (0.077)</td>
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</table>

\( D \)                                          |
| (0.352) (0.385) (0.409) (0.452) |
| (0.483) (0.878) (0.558) (1.039) |
| (0.116) (0.518) (0.136) |
| (0.081) |

\( D \times \Delta \tilde{R} \)                  |
| (0.181) (0.197) (0.223) (0.241) |
| (0.262) |

\( D \times (\Delta \tilde{R})^2 \)                |
| (0.196) (0.732) (0.311) (0.162) |

\( D \times (\Delta \tilde{R})^3 \)                |
| (0.717) (0.652) (0.089) (0.040) |
| (0.565) (0.303) |

Constant                                      |
| (0.181) (0.197) (0.223) (0.241) |
| (0.262) |

Sample size                                   |
| 995 995 995 995 872 872 |

Notes: \( D \) is a dummy variable which equals 1 if an individual is close to retirement (0 otherwise) or is equal to 1 if an individual has an older partner (0 otherwise). Standard errors in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

B.2. Results excluding housing wealth losses

It is often claimed that individuals do not think of housing wealth in the same way as other types of wealth, and that few individuals in the UK intend to draw down their housing wealth during retirement to fund consumption. This is often described in a 'mental
The financial capital framework, where individuals see pension and financial wealth as funding their retirement consumption and consider housing wealth as a stock that will be left as a bequest after they die. If this is the case then retirement plans would only be expected to be responsive to changes in non-housing wealth, while changes in housing wealth would be expected to affect bequests. In reality there is evidence to suggest that housing wealth is an important retirement resource that is utilised. Banks, Blundell, Smith and Oldfield (2008) find that downsizing is an important part of life for older households, and that over a 10 year period, 1 in 4 older homeowners in the UK moved out of their original home. They also stress the importance of other types of downsizing that are harder to observe, such as reduced maintenance of the home. However the mental accounts argument is a popular and intuitively appealing argument, and so this section repeats the main analysis of this work but considering the losses from different components of wealth separately.

The simulated losses to total wealth calculated according to equation 5 are split into three categories: losses from primary (owner-occupied) housing wealth, losses from pensions and losses from non-pension non-housing wealth (which includes losses from property wealth other than the primary home).

\[
\Delta A_{\text{housing}} = house_i \times (\Delta rHPindex^e - \Delta rHPindex_i) \\
\Delta A_{\text{pension}} = DCfund_i \times (\Delta FTSE_{DC}^e - \Delta FTSE_{DC_i}) \\
\Delta A_{\text{nph}} = investments_i \times (\Delta FTSE_{DC}^e - \Delta FTSE_{DC_i}) + property_i \times (\Delta avHPindex^e - \Delta avHPindex_i)
\]

The distributions of these simulated losses are shown in Figure 22, along with the distribution for total losses (as shown in Figure 9) and the distribution of total non-housing losses (the sum of pension and non-housing non-pension losses). The majority of the simulated wealth loss for most individuals comes from primary housing wealth while the losses from pension and non-pension non-housing wealth are simulated to be relatively small. Considering shocks to total non-housing wealth, only 23% of individuals are predicted to have lost more than 5% of their gross wealth and only 10% are predicted to have lost more than 10% (compared to 60% and 23% when the shock to primary housing wealth is included).
Figure 22: Distribution of simulated changes in wealth relative to expectations, by type of wealth

Figure 23 shows the estimated delays in retirement that would be required to offset the wealth loss from each type of wealth (if hours worked, consumption and bequests are to be left unchanged). The estimated required delays to offset losses to pension wealth and non-pension non-housing wealth are on average quite small - the median in both cases is just 0.1 year. The median estimated required delay to offset losses from primary housing wealth by contrast is 0.8 years. Taking non-housing wealth as a whole, the median required retirement delay is estimated to be 0.3 years, while the mean is 1.8 years (compared to the median of 1.3 years and mean of 3.5 years seen previously when all components of wealth were included in the shock).

Figure 23: Distribution of estimated required delay in retirement, by type of wealth

Figures 24 and 25 present results from the local linear regression analysis comparing the reported change in planned retirement age with the estimated change in the retirement age
required to offset the shock to housing wealth and non-housing wealth respectively. The local linear regressions include a constant and control for health shocks and can therefore be compared with figure 12 from the main results.

**Figure 24: Relationship between change in planned retirement age and estimated required change, shock from primary housing wealth only (controlling for health shocks and trend)**

![Figure 24](image1)

Notes: Sample size: 1,197. Dashed lines represent the 25th, 50th and 75th percentiles of the distribution of estimated required delays in retirement. Panel A: predicted delay in retirement is the predicted $\Delta R$ from the local linear regression. Panel B: Coefficient is $\beta$ from the local linear regression $\Delta R = \alpha + \beta \Delta R + \gamma \Delta H + \varepsilon$. Dotted lines describe the 95% confidence interval around $\beta$.

**Figure 25: Relationship between change in planned retirement age and estimated required change, shock from non-housing wealth only (controlling for health shocks and trend)**

![Figure 25](image2)

Notes: Sample size: 1,197. Dashed lines represent the 25th, 50th and 75th percentiles of the distribution of estimated required delays in retirement. Panel A: predicted delay in retirement is the predicted $\Delta R$ from the local linear regression. Panel B: Coefficient is $\beta$ from the local linear regression $\Delta R = \alpha + \beta \Delta R + \gamma \Delta H + \varepsilon$. Dotted lines describe the 95% confidence interval around $\beta$.

Figure 24 shows that individuals do not appear to adjust to losses from their primary housing wealth by changing their retirement plans - the coefficient from the local linear regressions is around zero and is statistically insignificant for most of the distribution. By contrast figure 25 shows that losses to non-housing wealth did have a positive association with retirement delays, although again the coefficient from the regressions was not significantly different from zero. There is therefore still no firm evidence that individuals responded to their
wealth losses from the financial crisis by altering their retirement plans, but these results do suggest that there might be something to the mental accounts argument, and that individuals are more likely to adjust to their non-housing wealth losses by delaying their retirement than they are their housing wealth losses. Small sample sizes and a limited distribution for the required retirement delay mean that separate analysis for pension wealth and non-pension non-housing wealth is not very reliable, however there is some indication that individuals might respond more through their retirement timing to losses from pension wealth than they do to losses from non-pension non-housing wealth.