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Booms, busts and retirement timing

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Centre for Market and Public Organisation
Bristol Institute of Public Affairs
University of Bristol
2 Priory Road
Bristol BS8 1TX
http://www.bristol.ac.uk/cmpo/

Tel: (0117) 33 10752
Fax: (0117) 33 10705
E-mail: cmpo-admin@bristol.ac.uk

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Richard Disney[1]
Anita Ratcliffe[2]
Sarah Smith[3]

[1] *University of Nottingham and IFS*
[2] *CMPO, University of Bristol*
[3] *CMPO, University of Bristol and IFS*

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Keywords retirement, wealth, unemployment
JEL Classification J26, D12

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Address for correspondence
CMPO, Bristol Institute of Public Affairs
University of Bristol
2 Priory Road
Bristol BS8 1TX
anita. ratcliffe@bristol.ac.uk
www.bristol.ac.uk/cmpo/

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Booms, busts and retirement timing*

Richard Disney†
University of Nottingham,
and IFS

Anita Ratcliffe‡
University of Bristol,
and CMPO

Sarah Smith§
University of Bristol,
CMPO,
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Abstract

This paper looks at the effect of asset prices and labour market conditions over the economic cycle on retirement timing in Great Britain. A priori, the effect of economic conditions is unclear; in an economic boom, positive wealth effects may induce earlier retirement but labour demand effects may work in the other direction. We exploit large variations in stock prices, local house prices, earnings and unemployment rates over the period 1991-2007 to identify which of the two effects prevails. We find little evidence that 'wealth' effects influence retirement timing, but we do find significant effects of labour market conditions, with higher unemployment rates leading to earlier retirement.

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†E-mail: richard.disney@nottingham.ac.uk

‡E-mail (corresponding author): anita.ratcliffe@bristol.ac.uk

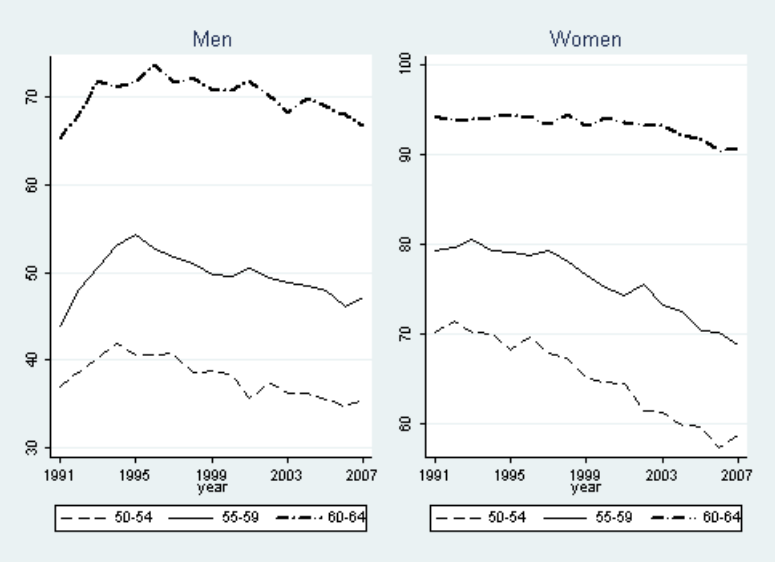
§E-mail: sarah.smith@bristol.ac.uk

1 Introduction

This paper examines how retirement decisions in Britain are affected by fluctuations in asset prices and local labour market conditions. Whilst it has been well documented that retirement timing in Britain is sensitive to incentives embedded in pension schemes (see for example Disney, Meghir, and Whitehouse, 1994; Blundell and Johnson, 1998; Blundell, Meghir, and Smith, 2002), relatively less attention has been paid to how the timing of retirement is shaped by wider economic forces (although see Meghir and Whitehouse, 1997). A better understanding of these issues is warranted, especially in the current economic climate when an economic downturn has followed a boom.

To provide some motivation for the analysis, figure 1 charts the proportion of men and women not in full-time employment, by year and age-group.[1] It shows that older men are more likely to be retired in the early 1990's recession, with this proportion falling during the economic expansion of the late 1990's and thereafter. The same pattern does not emerge for women, for whom the general decline in the proportion retired over time probably reflects cohort participation effects. At the same time there are regional differences in retirement behaviour. As Table 1 shows, people living in the (wealthier) South of England are much less likely to be retired compared to people living elsewhere. Economic conditions can potentially explain both the time series and regional variation in retirement behaviour.

Figure 1: Proportion of men and women not in full-time employment, by year and age-group



Source: UK Labour Force Survey

A priori, however, it is not clear how economic conditions will affect retirement. Much attention in recent booms and busts has focused on the effect of asset values on retirement which may affect retirement through wealth effects, and causing people to retire earlier during a boom (see inter alia

[1]For men, this is a good indicator of whether somebody is retired and to a lesser extent, for women (Banks and Smith, 2006).

Table 1: Proportion of people aged 51-69 retired, by regions of England

	Men	Women
East Midlands	.33	.48
East Of England	.32	.48
London	.34	.39
North East	.52	.55
North West	.41	.6
South East	.32	.46
South West	.38	.52
West Midlands	.42	.58
Yorkshire and The Humber	.41	.65

Source: British Panel Household Survey, 2000

Sevak, 2002; Coile and Levine, 2006; Farnham and Sevak, 2007). However, an upturn in economic conditions is also likely to increase the demand for labour, making it more attractive for older workers to remain in the labour market (Coile and Levine, 2009; Goda, Shoven, and Slavov, 2010). Changes in asset prices may themselves also have a potentially offsetting accrual effect, something that has received relatively less attention in the literature to date. If asset prices are rising, this increases the return to investing and may make it more attractive to delay retirement, particularly in the case of assets that are linked to employment (such as a pension). This is analogous to accrual or option value effects identified by Stock and Wise (1990) and Coile and Gruber (2007). Whether the 'wealth' effect dominates the accrual effect, and how the effect of asset prices compares to the effect of labour demand conditions are ultimately empirical questions.

To date, a number of studies have looked at the effect of asset prices and labour market conditions on retirement decisions in the US, but until now, this issue has not been examined in the context of British data. The UK makes an interesting comparison - and possible contrast - to the US, owing to differences in the exposure to, and evolution of, asset prices, combined with differences in the institutional settings across both countries. For example, house prices are more volatile, and housing wealth represents a larger share of household wealth in the UK compared to the US, whereas the reverse holds for share prices and equity wealth (Banks, Blundell, and Smith, 2002). Some features of the UK setting, however, may result in sharper accrual incentives for UK households.

We assess the influence of economic conditions on retirement decisions in the UK setting, using the British Household Panel Survey. This is an annual survey that contains detailed information on individual and household characteristics, including housing tenure and pension status. Using restricted-access geographical identifiers, house prices, unemployment rates and earnings are matched to respondents by year and local area of residence, to exploit large regional variation in the evolution of these variables, while share prices are matched to respondents on a yearly basis. Notably, we are the first to consider whether business cycle fluctuations in earnings affect retirement decisions.

Similar to previous studies using US data, we find no effect of house price changes on retirement,

and in spite of very large house price fluctuations in the UK. In contrast to previous studies, we also find no clear evidence of a positive correlation between stock market performance and early retirement for people invested in stock markets. If anything, the evidence suggests that accrual effects are important. In terms of labour market conditions, we find a large effect of unemployment rates on retirement behaviour but little evidence that earnings influence retirement decisions.

The remainder of this paper is structured as follows. The next section discusses how economic conditions may impact on retirement and why UK evidence may shed new light on an issue that has, to date, been analysed mainly from a US perspective. A summary of the main findings from existing literature is also provided here. Section 3 outlines the empirical approach and describes the data while section 4 presents the econometric results. Section 5 concludes the paper.

2 Economic conditions and retirement

Economic conditions affect retirement conditions in two, potentially conflicting, directions. First, an economic 'boom' may lead to more attractive employment opportunities for older workers, which may induce them to defer retirement. However, a boom may also be associated with increasing asset prices which may also affect retirement, potentially in the opposite direction. We discuss each of these in turn and explore the reasons why the UK is likely to make an interesting comparison - and possible contrast - to the US.

2.1 Labour market conditions

The incentive to retire depends (among other things) on the economic rewards to continued work. In a standard model, in which people retire from the labour market when their reservation wage exceeds their prospective market wage, we would expect to see an effect of labour market conditions through the impact on returns to working. Gordon and Blinder (1980) estimate market wages and reservation wages, the latter using observed characteristics, to examine retirement probabilities for US men using the Longitudinal Retirement History Survey. They find that retirement decisions are particularly sensitive to the gap between prospective market wages and reservation wages. Kingston (2000) also shows that individuals will retire earlier when prospective wages are lower, ceteris paribus. In their study of labour market transitions among UK men, Meghir and Whitehouse (1997) provide tentative evidence that higher life cycle earnings delays exit from employment using the 1988-89 UK Retirement Survey. Haardt (2007) replicates these results, with greater statistical precision, using more recent data from the BHPS.

These studies focus on the evolution of life-cycle wages, which generally decline as people approach retirement age, thereby reducing the incentive to remain in work. However, when the economy is expanding and wages are higher, the probability that current wages will exceed reservation wages - and that individuals will participate in the labour market - will increase. In a recession, the

opposite will be the case. Yet, to date, there is no evidence on the influence of wages fluctuations over the economic cycle on retirement decisions.

There are other reasons why retirement may be sensitive to economic conditions. Jobs are more widely available during economic booms simply because more jobs are created while there is less job destruction. The chances of continued employment, or re-employment after redundancy, are therefore higher. In a weak economy firms shed workers and job creation is lower, which increases the likelihood that people experience job loss when the opportunities for re-employment are limited. As the duration of unemployment increases, loss of skills may further hamper the chances of re-employment. Faced with tough labour markets, older workers may respond by leaving the labour force altogether. Different types of workers may fare better than others under these circumstances. Gomes (2009) shows that during recessions, the most educated workers exhibit a slightly higher probability of moving from employment to unemployment compared to the least educated workers but also exhibit a higher probability of moving back into employment. Overall, he concludes that less educated workers are most affected by business cycle fluctuations.

2.1.1 The UK context: similarities and differences with the US

Figure 2 illustrates the respective labour market experiences in the UK and US since 1991. We ignore earnings here, as the influence of business cycle earnings on retirement are not considered in existing empirical literature. In the UK, high unemployment rates prevailed during the recession of the early 1990's. But afterwards, unemployment rates fell continuously and more rapidly than in the US, reaching an all time low in early 2000. However, since 2008 unemployment rates have inched upwards again. While US unemployment rates were initially much lower than in the UK during the 1990's, unemployment rates increased somewhat after the millennium and hovered at similar levels to the UK thereafter. However, the effect of the recent recession on unemployment rates is more marked in the US.

Whether differences in labour market experiences translate into differential retirement outcomes in the UK and US will depend on the opportunities for early retirement (i.e other income options) in both countries. It is often remarked that disability benefits are used as an early retirement vehicle (Blundell and Johnson, 1998). The receipt of disability benefits is notably higher in the UK than it is in the US (Marin and Prinz, 2003), and the effect of the business cycle on disability claims is larger (Bentez-Silva, Disney, and Jimnez-Martn, 2010). Two features of disability benefits in the US may make it more attractive to low paid workers as a retirement vehicle. Firstly, applicants must wait 5 months before accessing non-means tested benefits but means tested benefits are available prior to this so it less costly for low paid workers to make disability claims. Secondly, disability benefits are tied to average earnings, and as real wages for low paid workers have been falling, replacement rates for this group have been rising (McVicar, 2008). In the UK, the disability benefit per se does not make it relatively more attractive for low paid workers to use as an early retirement vehicle, for example, replacement rates have been falling across the board and there is limited means-testing for

Figure 2: Unemployment in the UK and US (%)

Source: Office for National Statistics, Bureau of Labour Market Statistics

this particular benefit making it more accessible to high paid workers (McVicar, 2008), but low paid workers without a private pension may well be incentivised to retire early through the interaction of disability benefit and state pensions (Blundell and Johnson, 1998). And since the introduction of the UK pension credit in 1999, low paid workers can claim a means-tested benefit that is not conditional on seeking work from the age of 60.

2.1.2 Existing evidence

Meghir and Whitehouse (1997) present evidence that the national unemployment rate, which they argue proxies the job arrival rate, is linked to entry and exit rates from employment. They find older men are more likely to retire earlier when aggregate unemployment is higher, and more likely to move into work when unemployment is lower. Dorn and Sousa-Poza (2008) also find that rising unemployment rates at the national level are associated with a higher prevalence of involuntary early retirement in cross-country analysis.

Given limited mobility of workers, the state of local labour markets may be more relevant to the retirement decision. Coile and Levine (2006, 2007) argue that US state-level unemployment rates are a good proxy of local labour market conditions and their results suggest that a 1 percentage point increase in the unemployment rate increases the probability of retirement by 0.18 percentage points, with this pro-cyclical effect disproportionately concentrated among older workers with fewer skills.

However, studies that measure unemployment rates over smaller geographical localities do not produce consistent evidence. Haardt (2007) finds unexpected correlations between regional unemployment rates and employment transitions. For example, women tend both to exit and re-enter unemployment more quickly when unemployment rates are high. This may be a classic illustra-

tion of the 'added worker effect' whereby a wife's labour supply responds to a husband's job loss (Stephens, 2002). Similarly, Goda, Shoven, and Slavov (2010) find no evidence that county-level unemployment rates in the US affect retirement expectations.

2.2 Asset prices and pension rights

Cyclical movements in the labour market often, however, coincide with fluctuations in asset prices that could also affect retirement - and potentially have an offsetting effect. In the standard setting of the life cycle model, positive shocks to asset values may induce earlier retirement through a pure wealth effect (for evidence on the effects of pension wealth in Britain see Blundell, Meghir, and Smith, 2002). Insofar as an economic booms coincide with upsurges in stock prices and house prices, households may respond to this prospective increase in wealth by exiting the labour force earlier than they had previously expected. An economic downturn that coincides with falling asset prices may induce the opposite effect.

This 'asset price effect' is subject to significant caveats, however. Firstly, the underlying life cycle model of behaviour is predicated on responses to 'shocks' to asset values, not levels. Insofar as households may expect capital gains, realised increases in asset prices have to be judged against expectations, whether measured directly or by deviations from trend. This has led some analysts to focus on explicit 'windfalls' as measured by, say, inheritances, as pseudo-instruments for unanticipated asset gains when analysing wealth effects (see for example Brown, Coile, and Weisbenner, 2010) although even here there may be some concern that inheritances are anticipated.

Secondly, in the case of housing assets, with transaction costs and psychic costs, the present value of the additional annuity arising from liquidating housing wealth is rather low until very late in life. So very large increases in house prices are necessary to induce early retirement, and even then, households must be willing to downsize housing assets to take advantage of additional wealth.

Thirdly, there is a potentially offsetting incentive effect when asset prices change, or are expected to change in the next period. Suppose share prices are rising, then by retiring and cashing in equity holdings, individuals forgo any future gain to the accumulated fund value and to any additional contributions made. Consequently, individuals may have an incentive to delay retirement because they would otherwise lose out on a potential wealth gain. This is analogous to accrual or option value effects identified by Stock and Wise (1990) and Coile and Gruber (2007) in relation to pensions. Of course, individuals may retire without cashing in their equity holdings if they have other income to live on. But by delaying retirement and continuing to work, they can also make further investments out of their earnings. In this respect, it is likely that accrual effects will matter more for pension equity investments than direct shares because contributions made out of earnings into private pensions are tax-free in the UK and US, making it more attractive to earn and invest in pension equity. On the other hand, when share prices are falling, equity wealth shrinks. So individuals may retire earlier to protect their wealth against further potential losses. While accrual effects

of this kind are noted in Attanasio, Banks, Blundell, Chote, and Emmerson (2004) and Banks and Smith (2006), they are not considered in earlier studies of stock market performance and retirement behaviour.

2.2.1 The UK context: similarities and differences with the US

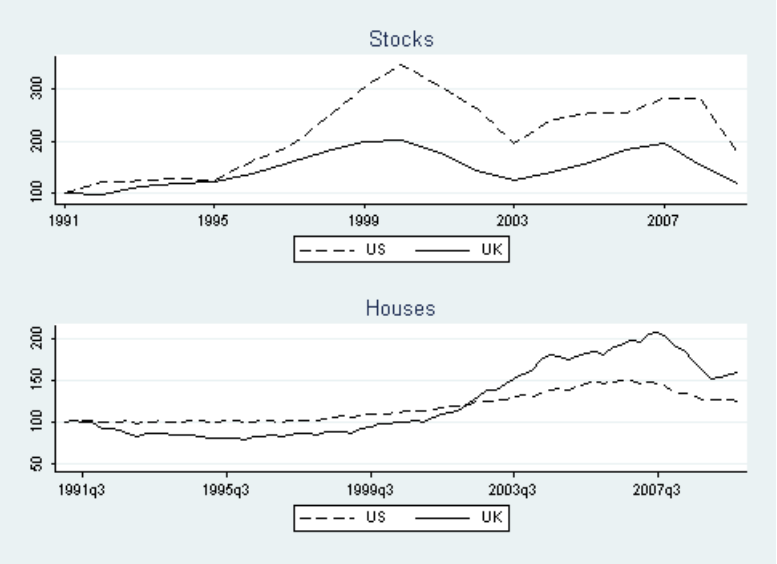
Figure 2.2.1 documents the evolution of real asset prices in the UK and US since 1991. For ease of comparison, these asset price indices are re-based to start at 100 in 1991. The upper panel of figure 2.2.1 focuses on the respective stock price indices in both countries. Share prices remained flat in both countries until 1995 but rose less sharply in the UK during the stock market boom of the millennium. Share prices also fell less sharply in the UK during the stock market bust that followed. Nevertheless, share prices in the UK increased by a non-trivial 50 percent during the boom phase.

UK households are less exposed than US households to stock market fluctuations; they are less likely to have direct shares, and these investments are worth less. 50 percent of US households own direct shares compared to 40 percent of English households, and the value of these holdings is three times larger in the US (Christelis, Georgarakos, and Haliassos, 2010). But as private pensions are common in the UK and US, many households have both direct shares and pension equity wealth. In the UK, however, more households have direct shares than pension equity wealth, for example, one half compared to one fifth of households (Banks, Tetlow, and Wakefield, 2008), but in the US, more households have pension equity wealth than direct shares, for example, one half compared to one third of households (Wolff, 2007; Sierminsak, Michaud, and Rohwedder, 2008). In both countries, the value of direct shares is larger than pension equities (Banks, Tetlow, and Wakefield, 2008; Wolff, 2007; Sierminsak, Michaud, and Rohwedder, 2008).

Less pronounced movements in UK share prices combined with smaller holdings of equity wealth may indicate a reduced scope for changing share prices to affect retirement decisions in the UK compared to the US. Differences in the numbers that hold direct shares and pension equity across both countries may be relevant if pension accrual effects exist, although ultimately holdings of direct shares are larger in both countries. But there are two features specific to the UK setting that may make accrual incentives particularly salient in the case of pension equity investments. Firstly, to take any money out of a private personal pension prior to 1995, individuals had to use three-quarters of the fund to purchase an annuity. Since 1995, individuals can delay purchasing an annuity until age 75 and use an income draw-down option but there are additional costs and risks associated with this (Blake, 2003), and the majority do not use this option (Cannon and Tonks, 2010). Essentially, this means individuals are not in a position to keep most of their money invested in shares when they retire, which would otherwise allow them to take advantage of rising stock markets without continued work or to wait until stock markets pick up again when in free fall. Secondly, individuals with private pension schemes can 'contract out' of the second tier state pension and relinquish their entitlement to this pension by doing so. The majority of individuals in the UK have taken

this option. But this leaves individuals with pension equity particularly vulnerable to stock market fluctuations as the basic state pension 16 percent of average earnings in the UK (Blundell and Johnson, 1998), whereas in the US, public pensions provide replacement rates of about 40 percent (Banks and Blundell, 2005). UK households may therefore face sharper pension accrual incentives.

Figure 3: Real asset price indices in the UK and US



Source: Halifax House Prices, Federal Housing Finance Agency, Thomson Reuters Datastream

While stock prices exhibit less variation in the UK than the US, a different picture emerges for house prices (see lower panel of figure). UK house prices fell throughout the early 1990's but increased rapidly after the millennium. At the height of the housing market boom, property prices stood at twice the level observed in 1991. Contrast with the US, where house prices remained flat over much of the 1990's and increased by only half as much (50 percent) at the pinnacle of the boom. In both countries, over three quarters of households aged 50-69 own their own home but UK households have more wealth invested in housing compared to US households (net equity among UK households is one tenth higher than among US households) and housing wealth comprises a larger share of total wealth for UK households (Banks, Blundell, and Smith, 2002). Downsizing occurs in both the UK and US, although the extent of downsizing is somewhat greater in the US (Banks, Blundell, Oldfield, and Smith, 2007). Overall, larger changes in house prices combined with a greater importance of housing wealth for UK households suggests that housing wealth effects may be more likely to materialise in the UK context. If there is no evidence of housing wealth effects in the UK, in spite of large sustained increases in house prices, this might represent powerful evidence against housing wealth effects.

2.2.2 Existing evidence

Several researchers have examined the influence of stock market fluctuations on retirement behaviour. Gustman and Steinmeier (2002), using a dynamic structural model, obtain the largest

estimate of a stock price wealth effect on retirement for the United States. They suggest that at the peak of the stock market boom in the late 1990s (during which Cheng and French (2000) suggested that investors received an unexpected windfall of between $1.2 and $1.5 for every $ invested), participation rates of older workers declined by 3.3 percentage points. But evidence from reduced form models is more mixed.

Sevak (2002) analyses whether year-to-year fluctuations in retirement transitions in the United States can be explained by unexpected changes in the value of wealth portfolios of financial assets - stock holdings, employer-provided defined contribution pension plans and Individual Retirement Accounts (IRAs). Using Health and Retirement Survey (HRS) data from the 1990s, she concludes that unanticipated gains in the value of these assets increase retirement transition probabilities among men, but only when imputed rather than self-reported values of pension fund values are utilised in the regressions. In somewhat similar vein, Coronado and Perozek (2003) use HRS data between 1992 and 2000 to examine the impact of asset values of retirement, utilising differences between self-reported expected and actual retirement ages. Wealth shocks are constructed by multiplying reported initial stock market wealth by imputed gains in the Wiltshire 500 stock market index, less an expected growth factor. Their results suggest that a $100,000 increase in unexpected gains is associated with retiring 2 weeks earlier than expected.

A drawback to conditioning unexpected gains on the previous wealth stock is that initial differences in wealth-holdings may reflect heterogeneity in underlying preferences over wealth-holding which likely correlate with preferences between work and leisure. A number of papers therefore ignore self-reported wealth and exploit only the variation in stock market prices over time while utilising the fact that a fraction of households hold stocks at any point in time. The implicit 'treatment' is that stock market fluctuations only affect stock holders. Results from this methodology are inconclusive. Kezdi and Sevak (2004) find that stock market investors are more likely to be in the labour market irrespective of the performance of the market. These authors use the Current Population Survey (CPS), where stock ownership has to be inferred from dividend receipts. Using the same data set, Coile and Levine (2006) also find no evidence of changes in labour force participation caused by the boom and bust of the stock market up to 2003. However, in their updated study, Coile and Levine (2009) find some evidence that 10 year returns on the S&P 500 do affect the retirement transitions of the most educated and oldest (age 62+) workers in their CPS data set.

An innovative research design is used by Goda, Shoven, and Slavov (2010) who investigate the impact of the recent decline in the stock market on retirement expectations. They exploit the differences in interview dates in the HRS, which they argue are exogenous, and match S&P 500 levels and growth rate to each respondent's interview date, thereby utilising within-year variation in market performance. Using a model in differences to control for respondent heterogeneity, they find that higher stock price levels and growth rates reduce the self-reported probability of working beyond age 62 in the period 2006 to 2008, especially among respondents aged 58 or more. However the result does not hold over a longer time frame (1998-2008) and those groups who might be

considered a priori the most sensitive to market fluctuations (without DB pension plan rights or with low overall wealth) are the least sensitive in their retirement behaviour, leading the authors to question the generality of the result.

The only study of a somewhat similar type for the UK comes from Blake (2004). He uses time series variation in the participation rate of individuals at or above the state pension age, which is regressed on the per capita value of assets in defined contribution pension plans and other wealth variables. Higher levels of private pension wealth at any point in time are associated with later average retirement. Given the formidable aggregation problems and the somewhat reduced form nature of the analysis, coupled with the choice of age group, it is perhaps hard to draw any clear-cut behavioural inferences from this analysis.

A number of researchers have examined whether fluctuations in the value of owner-occupied housing affect retirement decisions. Most such studies exploit differences in retirement behaviour between owners and renters (analogous to the distinction between stockholders and non-stockholders) and/or spatial variations in house price fluctuations to identify these effects.

Farnham and Sevak (2007) use HRS data matched to Metropolitan Statistical Area house prices to investigate the house price-retirement relationship. They assume that retirement behaviour over the period of the HRS survey is affected by the cumulative gain in house prices in each metropolitan area over the period of the survey. For some specifications, house price gains are detrended using linear state trends. The authors find that above-average house price gains are associated with retirement, but this result is highly sensitive to the exclusion of state-level fixed effects. Moreover, within the state, renters and owners seem to respond identically to house price gains. Similar insignificant differences are found in terms of changing retirement expectations - a result also confirmed by Goda, Shoven, and Slavov (2010) using the methodology described previously. Coile and Levine (2009) match a different house price index (the 'Case-Shiller' index) and also find no impact of house price changes on retirement behaviour. Blake (2004) in his time series regressions for the UK, even gets a negative correlation between retirement rates and the per capita value of housing wealth.

3 Empirical Approach

In this analysis, as in Coile and Levine (2009), we use discrete-time duration analysis to model the time elapsed from age 50 until complete withdrawal from the labour market (see Allison, 1982; Jenkins, 1995, for references). For ease of interpretation, since we use a number of interaction terms, we write down the following hazard function, which results in the logit model:

$$\theta_{\mathrm{ik}} = \frac{1}{1 + \exp(-\mathrm{x}'_{\mathrm{ikjt}}\beta - \pi_{\mathrm{j}} - \delta \mathrm{t})} \tag{1}$$

where

$$\begin{aligned} x'_{ikjt}\beta = &\beta_1 \%\Delta \text{FTSE}_t + \beta_2 \%\Delta \text{FTSE}_t * \text{investor}_{ikjt} + \beta_3 \%\Delta \text{HP}_{jt} + \beta_4 \%\Delta \text{HP}_{jt} * \text{homeowner}_{ikjt} \\ &+\beta_5 \text{unemployment}_{jt} + \beta_6 \text{earnings}_{jt} + Z'_{ikjt}\gamma \end{aligned}$$

This specification for the hazard function θ_{ik} implies that whether someone retires at age k, given that they have not previously retired, depends on their characteristics at that age, indexed by i and k respectively, and on economic forces that evolve over time, indexed by t, that may exhibit an area dimension, indexed by j. It thus captures the fact that two people of the same age and characteristics but observed years apart are subject to different economic circumstances that may affect their decision to retire. Similarly, it captures the possibility that people are subject to different economic circumstances because they live in different areas. The hazard function also contains area fixed effects π_j and a general time trend δt. Including area fixed effects means that identification of area-specific economic conditions on retirement behaviour is provided through the variation in these variables over time within that area. This is important because while higher unemployment in area A relative to area B may reflect unobserved preferences for work within each area, differential changes in unemployment over time in area A compared to area B better reflects employment opportunities/constraints.

The main economic variables are the year-on-year growth rate in stock prices, which is interacted with investor status. If the 'wealth' effect dominates the 'accrual' effect, we would expect to observe that people who are invested in stock markets (own shares or a private pension) retire earlier than others when the stock market goes up. There should be no effect of stock prices on people without investments. Next is the year-on-year growth in local area house prices, which is interacted with homeowner ship status. If a housing wealth effect exists, homeowners are expected to retire earlier compared to renters in areas that experience strong house price growth. The baseline effect for renters can be viewed as a control for local area factors that change over time and are correlated with both house prices and retirement timing. Finally, local earnings and unemployment levels measure local labour market conditions. These are constructed to be gender specific such that male unemployment rates are matched to male respondents and vice versa. It is possible that age specific unemployment rates may provide a better measure of job separation rates for older workers if firms shed more senior staff first and vice versa. But this has to be weighed against the possibility that labour market exits of older workers, induced by higher rates of job separation, directly affect age-specific unemployment rates. A general measure of economic conditions mitigates this possibility. Moreover, it is not clear whether staff seniority or skill level is the relevant dimension that firms consider when shedding staff.

Differences in socio-demographics are taken into account by controlling for gender, marital status, household composition, education, health, whether the individual has a private pension with

their employer (i.e DB scheme)[2] or has a private personal pension (i.e DC scheme), whether they are employed in the public sector, and whether they are a homeowner or investor.[3] Gender specific age dummies allow for a flexible baseline hazard. In robustness checks, we use information on a partner, if one is present in the household, to account for joint decision making within a reduced form framework (see for example Coile, 2004). These variables include the partner's labour market status, whether they have a private or employer pension, whether they are invested in the stock market, and also the same interactions of the main economic variables. Wealth stocks per se do not feature in these models because these are likely to be endogenous to retirement decisions.

3.1 Data

Data are taken from the British Panel Household Survey (BHPS) between 1991-2007. This is a nationally representative survey[4] of more than 5 000 British households (approximately 10 000 adults) and contains detailed information about each respondent. The sample contains all individuals aged 51-69, who report that they are in the labour market (either employed or looking for work) in the previous year. As in previous studies, individuals are followed up to the point of retirement, which is defined as when they permanently withdraw from the labour market[5] and people who move into retirement subsequently exit the sample. The choice to include all people aged over 50 in the sample, as opposed to restricting the sample to people aged 50 in 1991 is deliberate because in the latter case economic circumstances become age specific. This is likely to lead to biases because house prices and stock prices shoot up towards the end of the nineties, affecting only those people with intrinsically lower hazard rates, and potentially underestimating the effect of economic conditions. Figure 4 illustrates how the baseline hazard, calculated from the pooled BHPS sample, varies by gender. Clearly, the age at which is is possible to start drawing a state pension, age 60 for women and 65 for men, has a big influence on retirement decisions.

The BHPS collects information on private personal pensions and share ownership, which is used to identify who is invested in the stock market. Since 1992 the BHPS asks respondents whether they have made any contributions to a private personal pension scheme in the past year. If the

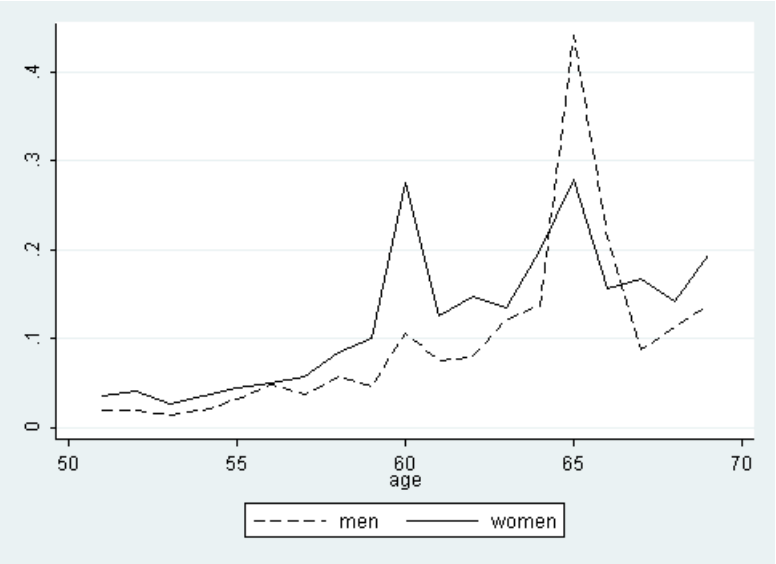
[2]Some individuals with a pension scheme provided through an employer will have a DC as opposed to DB scheme but this much less uncommon (see Banks and Blundell, 2005).

[3]For variables that are conditional on labour market status, such as pension status, information from the previous year is applied to individuals observed to retire.

[4]To maintain representativeness of the British population, sample members are followed over time even as they move address and/or form new households. If sample members form new households, all adults in these households are also interviewed. Furthermore, children of household members are interviewed once aged 16. Note that booster samples for Scotland and Wales are added in 1999 and in 2001 for Northern Ireland but original sample members only are used here.

[5]In the year that people exit the labour force, 78% report their economic activity status as retired, 8% as caring for family and 14% as long term sick. This differs considerably by gender; 1% of men describe themselves as caring for family, with the remaining 80% and 19% reporting retired and long term sick respectively. Women are much more likely to describe themselves as caring for family (14%) and less likely to describe themselves as long term sick (10%).

Figure 4: Retirement hazard by gender



Note: pooled BHPS sample 1991-2007

respondent answers yes to this question they are also asked the year the pension scheme started.[6] In 1995, 2000 and 2005 the BHPS asks respondents about their financial assets, including whether they own shares, gilts or trusts. Because this information is asked intermittently and not at the beginning of the survey, some imputation is required to match information from these three years to other years. Details are given in the appendix. Taken together this information is used to determine a set of stock market investors who are potentially affected by changes in stock markets. The BHPS also collects information on self-reported tenure status, albeit at the household level. For this reason, the analysis is restricted to respondents listed as the principal owners and renters in a household. Summary statistics for socio-demographic variables available in the BHPS are presented in table 2.

Asset prices, earnings and unemployment are matched to the BHPS. Stock prices are taken from the FTSE 500 daily price index, which is averaged over the year to construct a yearly stock price. Restricted access postcode area identifiers in the BHPS are used to match local level house prices, earnings and unemployment rates to respondents. There are 124 postcode areas in the UK and 99 are present in the BHPS sample of people aged 51-69. The finer level of spatial disaggregation represents a marked improvement on previous literature where 'local' variables are measured at the UK regional level or US state level. This means that we are better able to approximate the house prices and labour market conditions that people face. Local area house prices are supplied by HBOS, who produce The Halifax House Price Index[7] while full-time weekly earnings and unemployment rates are taken from the New Earnings Survey, the Annual Survey of Hours and Earnings, and Nomis

[6]If a respondents always answers no to this question it is assumed that they do not have a private pension scheme although in principal they could have opened a scheme in the past but failed to make any recent contributions.

[7]Note the BHPS asks homeowners to report the estimated market value of their home but investment in housing and therefore self-reported house values are likely to be endogenous.

Table 2: Summary statistics for BHPS variables

	mean	sd	min	max
retired	0.07	0.26	0.00	1.00
homeowner	0.86	0.35	0.00	1.00
investor	0.63	0.48	0.00	1.00
personal pension	0.48	0.50	0.00	1.00
employer pension	0.52	0.50	0.00	1.00
self-employed	0.16	0.37	0.00	1.00
public sector	0.25	0.43	0.00	1.00
some further ed	0.38	0.49	0.00	1.00
college ed	0.24	0.43	0.00	1.00
age	57.01	4.52	51.00	69.00
female	0.47	0.50	0.00	1.00
nonwhite	0.03	0.17	0.00	1.00
partner	0.84	0.37	0.00	1.00
widowed	0.04	0.19	0.00	1.00
divsep	0.09	0.28	0.00	1.00
2 household adults	0.56	0.50	0.00	1.00
3+ household adults	0.32	0.47	0.00	1.00
children at home	0.09	0.29	0.00	1.00
health probs	1.19	1.19	0.00	8.00
N	15534			

(official labour market statistics) respectively. Details of how these variables are constructed can be found in Ratcliffe (2010) and summary statistics are presented in table 3. There is considerable variation in both the growth rate of asset prices and labour market variables across geographies and time. The measure of unemployment is based on claimant counts taken from administrative data, and while there is a great deal of overlap between unemployment measured via claimant counts and the official measure (based on the Labour Force Survey (LFS)), these series differ because some people do not claim benefits but are unemployed. This includes people whose partner is working (who are therefore not entitled to claim benefits), students, the long-term sick and people who left their previous job voluntarily. Figure 5 in the appendix compares three UK unemployment series; the official LFS measure, the claimant count measure from Nomis and an aggregated measure based on Nomis postcode area data. For men, the three series are similar until 1995 but Nomis data diverge thereafter, which reflects the last major change in benefit entitlement rules. For women, the LFS series is constantly higher, which is not surprising given that many women may not be entitled to claim benefits as their partner is employed. The advantage of using claimant count data over LFS survey data is that the former is very accurate at smaller geographies. Administrative data contains the entire sample of claimants and therefore claimant counts are not affected by sampling variability that tends to plague the LFS unemployment measure at sub-regional geographies.[8]

[8]For details see `http://www.statistics.gov.uk/downloads/theme_labour/unemployment.pdf`

Table 3: Summary statistics for asset/labour market variables

	mean	sd	min	max
%Δ FTSE	4.62	10.39	-18.19	15.63
%Δ house prices	5.05	9.85	-20.17	39.23
male unemployment rate	6.02	3.74	0.93	25.37
female unemployment rate	2.11	1.20	0.35	7.50
male weekly earnings	446.23	76.85	309.07	832.35
female weekly earnings	328.77	58.91	224.03	580.42

Note: all asset prices are adjusted for inflation.

4 Results

The logit model is equivalent to a proportional odds hazard model. The estimated coefficients represent the change in the log odds of retirement associated with a unit change in a regressor and exponentiated coefficients represent odds. It is more instructive, however, to calculate the implied marginal effect on the conditional probability of retirement (the hazard) of a unit change in a regressor. However, testing hypothesis about interaction effects is much more complicated in non-linear models compared to linear models (Ai and Norton, 2003). Statistical packages do not routinely calculate correct marginal effects and statistical tests but Norton, Wang, and Ai (2004) have developed a program which calculates the correct expression for the marginal effect at the sample mean of other variables, along with appropriate standard errors. Given that most other variables in the analysis are dummy variables, it is preferable in this context to calculate the sample average marginal effect. To illustrate, denoting $\text{MFX} = \frac{\partial \theta}{\partial \text{HP}\Delta\text{HO}}$ as the marginal effect for the interaction term %ΔHP*homeowner (where HO is short for homeowner), we calculate the sample average marginal effect as:

$$\text{MFX} = \text{n}^{-1}\text{a}_\text{i}^{-1}\sum_{\text{i}=1}^{\text{n}}\sum_{\text{k}=\text{a}_{\min}}^{\text{a}_\text{i}}(\gamma_{\text{HO}}+\beta_4)\theta_{\text{ik(HO=1)}}[1-\theta_{\text{ik(HO=1)}}]-\beta_3\theta_{\text{ik(HO=0)}}[1-\theta_{\text{ik(HO=0)}}] \qquad (2)$$

which reflects an average taken over all individuals at all ages that they are observed, with HO=1 indicating that the homeowner dummy variable is set to 1 *for all individuals* and HO=0 indicating that the homeowner dummy variable is set to 0, and γ_{HO} denoting the estimated coefficient on the home ownership dummy. A similar calculation is made for the interaction term %ΔFTSE*investor. Interaction effects and standard errors are obtained by randomly sampling individuals (with replacement), calculating the interaction effect for each sample and reporting the average effect with the associated standard error. The results are based on 50 iterations, and a further adjustment is made so that all marginal effects reflect the percentage point change in the hazard following a one unit increase in a particular variable.

Column 1 of table 4 reports estimated coefficients from the logit model. For brevity only results for the key economic variables are reported although results referring to socio-demographic variables

can be found in table 7 in the appendix. A regressor that increases the log odds of the retirement hazard reduces the length of time elapsed until retirement. To interpret the magnitude of these effects, column 2 presents the marginal effects, along with standard errors, that are implied by the estimated coefficients. The third column presents the corresponding marginal effects obtained from a linear probability model (LPM), which may provide a suitable approximation to the logit model and has the advantage that marginal effects for interaction terms are calculated more easily, as are linear combinations of variables. Again, all marginal effects are adjusted to reflect the percentage point change in the hazard following a one unit increase in a particular variable. The similarity of these marginal effects suggests the LPM does a good job at modelling the hazard.

Table 4: Conditional probability of retirement

	(1) Logit coeff	(2) Logit MFX	(3) LPM
weekly earnings/10	-0.0207	-0.1205	-0.0243
	(0.0210)	(0.1305)	(0.1175)
unemployment rate	0.0497**	0.2890**	0.2955**
	(0.0198)	(0.1375)	(0.1354)
%Δ HP	0.0031	0.0214	0.0166
	(0.0086)	(0.0657)	(0.0657)
%Δ HP*homeowner	-0.0071	-0.0496	-0.0315
	(0.0092)	(0.0659)	(0.0686)
%Δ FTSE	0.0074	0.0496	0.0534
	(0.0053)	(0.0349)	(0.0349)
%Δ FTSE*investor	-0.0131**	-0.0809*	-0.0790**
	(0.0066)	(0.0467)	(0.0397)
N	15534		15534
%Δ FTSE+%Δ FTSE*investor			-0.026
Standard error			0.024

*p<0.1, **p<0.05, ***p<0.01.

Standard errors account for clustering within same area and time period.

Marginal effects refer to the percentage point change in the conditional probability.

See section 3 for details of other variables included in the model.

Business cycle fluctuations in earnings are negatively correlated with retirement timing, which points towards older workers delaying retirement when opportunities to earn more arise. However, this evidence is suggestive because ultimately this effect is not precisely determined. On the other hand, there is clear evidence that older workers are sensitive to labour demand conditions, retiring earlier when faced with higher unemployment rates. Given that previous studies adopting small geographies generally find mixed evidence that unemployment rates influence retirement behaviour (see for example Haardt, 2007; Goda, Shoven, and Slavov, 2010), this is an important result. Moreover, it implies substantial effects of labour market conditions on retirement decisions in the UK, for example, the conditional probability of retirement increases by 0.29 percentage points for every

percentage point increment to local unemployment rates. This is larger than the effect found using US data and is something we return to below.

Turning to the effect of asset prices on retirement decisions. Despite property prices doubling over a short space of time in the UK, and thus providing homeowners with potentially sizeable positive wealth shocks, there is no evidence that housing wealth influences retirement decisions. Similar to Coile and Levine (2009), the effect of house price growth on retirement timing even goes in the 'wrong' direction for homeowners. Given that house prices increased by so much in the UK, and much more than in the US, the lack of evidence supporting a housing wealth effect in the UK setting provides a clear signal that housing wealth is not used to fund early retirement. In addition, there is no indication that potential shocks to equity wealth are used to fund early retirement in the UK. Instead, the evidence hints at accrual effects; compared to people without stock market investments, those with investments retire later when stock markets perform well. Specifically, for every percentage point increase in stock price growth rates, people with investments are 0.08 percentage points less likely to retire compared to others without investments. But overall, the effect of stock prices on people with equity investments, given at the bottom of column 3, is not significantly different from zero. This resonates with the work of Coile and Levine (2006) and Coile and Levine (2009) who find that, as a group, investors are not sensitive to yearly growth rates in share prices. In robustness analysis (discussed below), we look the effect of longer-term growth rates in stock markets and also find no evidence of wealth effects.

The estimated effect of rising unemployment on retirement timing is larger than that found in US studies. Coile and Levine (2009) find a one percentage point increase in local unemployment rates increases the conditional probability of retiring by 0.18 percentage points. Goda, Shoven, and Slavov (2010) find no evidence that unemployment rates affect retirement expectations. There are alternative explanations for this discrepancy. One possibility is that the institutional setting in the UK may present better opportunities for early retirement, through say, the UK pension credit. But methodological differences could also be important. In this study, unemployment rates are measured at a lower level of spatial disaggregation and are based on claimant counts taken from administrative data. One way to to show that these estimates are not driven by differences in the measurement of unemployment, is to replicate the analysis using the official LFS measure of regional unemployment, which spans a larger geography and is not based on claimant counts.[9] The first column of table 5 reports the result. Notice that in this specification, postcode area dummies are replaced by region dummies so postcode area earnings are excluded. If anything, LFS unemployment rates result in a larger, not smaller, estimate of the effect of labour demand conditions on retirement timing. This suggests that the larger estimate of labour market effects arises through institutional, rather than methodological, differences.

[9]Unemployment rates at the regional level are available from the second quarter of 1992, thus for consistency quarterly unemployment rates are averaged over the second, third and final quarters to provide a yearly measure of regional unemployment rates.

Table 5: Further evidence on labour market conditions

	(1)	(2)
weekly earnings/10		-0.023
		(0.118)
LFS regional unemployment rate	0.376**	
	(0.189)	
unemployment rate		0.341**
		(0.160)
unemployment rate*some further ed		-0.102
		(0.150)
unemployment rate*college ed		-0.004
		(0.181)
%Δ HP	0.025	0.017
	(0.066)	(0.066)
%Δ HP*homeowner	-0.034	-0.032
	(0.068)	(0.069)
%Δ FTSE	0.053	0.053
	(0.035)	(0.035)
%Δ FTSE*investor	-0.076*	-0.079**
	(0.040)	(0.040)
area dummies:	region	postcode
N	15534	15534
%Δ FTSE+%Δ FTSE*investor	-0.023	-0.026
Standard error	0.024	0.024
unemployment+unemployment*some further ed		0.238
Standard error		0.158
unemployment+unemployment*college ed		0.337
Standard error		0.183

*p<0.1, **p<0.05, ***p<0.01.

Standard errors account for clustering within same area and time period.

Marginal effects refer to the percentage point change in the conditional probability.

See section 3 for details of other variables included in the model.

The institutional setting may also determine whether some workers are disproportionately affected by labour demand conditions. For example, using US data, Coile and Levine (2009) find the effect of labour market conditions is concentrated among people with lower skills (where skill level is proxied by education). In contrast, we find that people with higher skills are no more, or less, likely to retire earlier when economic conditions worsen, compared to people with fewer skills. In column 2 of table 5, we interact the measure of unemployment with an indicator for further education (people who left full-time education after the legal minimum age but before age 19) and an indicator for higher education (people who left full-time education aged 19+), with the base category representing the effect for people who left school at the minimum legal age. These interaction terms, while negative are not significant, and in particular, the interaction term with college education is negligible.

4.1 Additional evidence supporting an accrual effect

The basic result presented in table 4 does not support the premise that changing asset prices influence retirement timing through wealth effects. In particular, in the case of share prices, the evidence is more in line with an accrual effect. In this section, we explore why people with investments in the UK retire later, compared to others, when stock markets perform well. One possible reason is that among the group without stock market investments are those people with DB pensions plans provided by their employers. When stock markets perform well, pension scheme surpluses may allow employers to offer early retirement to their employees. The negative interaction term could therefore arise not because people with stock market investments retire later when stock markets perform well but because people with employer pensions retire earlier. One way to verify this is to separately add an interaction term for people with employer pensions (the majority of which are DB pensions). In addition, another relevant test to show that accrual effects are really the reason behind this result, is to separately look at the effect of pension and non-pension related equity holdings as stock markets fluctuate. As we argued in section 2.2, accrual effects are more likely to materialise for pension related equity as opposed to non-pension related equity. Thus, we split investors into those with private personal pensions and those with free standing shares.[10] Results are reported in column 1 of table 6. The interaction term for people with employer pensions is marginally negative, which is not consistent with the evidence pointing towards accrual effects being driven by people with employer pensions retiring earlier when stock markets perform well. Moreover, it is only people with private pensions that retire later compared to others, and this is precisely the group who are anticipated to be most sensitive to accrual incentives. Overall, however, there is no effect of fluctuating share prices on the retirement behaviour of this group.

Gauging how people approaching retirement respond to stock price fluctuations may provide further insight into accrual effects. Arguably accrual incentives would only matter for people who

[10]To deal with missing data, a dummy variable is created to identify where data is missing and missing values are replaced with the sample mean.

Table 6: Additional evidence on accrual effects

	(1)	(2)
weekly earnings/10	-0.025	-0.027
	(0.118)	(0.117)
unemployment rate	0.300**	0.298**
	(0.135)	(0.136)
%Δ HP	0.013	0.016
	(0.066)	(0.066)
%Δ HP*homeowner	-0.028	-0.029
	(0.069)	(0.069)
%Δ FTSE	0.050	
	(0.039)	
%Δ FTSE*investor		
%Δ FTSE*employer pension	-0.008	
	(0.035)	
%Δ FTSE*personal pension	-0.086**	
	(0.035)	
%Δ FTSE*shares	0.000	
	(0.037)	
≥ 4yrs ∗%Δ FTSE		0.062*
		(0.032)
≥ 4yrs ∗%Δ FTSE*investor		-0.069*
		(0.036)
3-2yrs ∗%Δ FTSE		0.115
		(0.096)
3-2yrs ∗%Δ FTSE*investor		-0.236*
		(0.124)
1yr ∗%Δ FTSE		0.194
		(0.144)
1yr ∗%Δ FTSE*investor		-0.450**
		(0.210)
eligible ∗%Δ FTSE		-0.065
		(0.119)
eligible ∗%Δ FTSE*investor		0.099
		(0.158)
N	15534	15534
%Δ FTSE+%Δ FTSE*private pension	-0.036	
Standard error	0.035	
≥ 4yrs ∗%Δ FTSE + ≥ 4yrs ∗%Δ FTSE*investor		-0.007
Standard error		0.021
3-2yrs ∗%Δ FTSE + 3-2yrs ∗%Δ FTSE*investor		-0.121
Standard error		0.075
1yr ∗%Δ FTSE + 1yr ∗%Δ FTSE*investor		-0.255
Standard error		0.150

*p<0.1, **p<0.05, ***p<0.01.

Standard errors account for clustering within same area and time period.

Marginal effects refer to the percentage point change in the conditional probability.

See section 3 for details of other variables included in the model.

plan to retire in the near future. While we do not know exactly when people plan to retire and therefore how close they are to an expected retirement date, many people retire once they are eligible to collect a state pension (see figure 4) and we use this to construct a measure of how far away people are from 'expected' retirement. Table 6 shows that accrual effects are strongest in the years just prior to anticipated retirement. For presentation purposes the terms 'Xyrs $*\%\Delta$ FTSE' indicate the stock market effects for people without investments X years before the state pension age and the interaction term represents the difference in behaviour for people with stock market investments, with the sum of these effects reported at the bottom of the table. The implied marginal effect of growth in stock prices for people with stock market investments on the conditional probability of retirement is monotonically increasing (in an absolute sense) from -0.007 4+ years before state pension age, -0.12 3-2 years before state pension age and -0.26 in the year before eligibility. Moreover, this latter effect is statistically significant. This result implies that in the year before expected retirement, a 1 percentage point increase in the growth rate of stock prices reduces the conditional probability of retirement by -0.26 percentage points among people with stock market investments.

4.2 Other robustness checks

The results presented in this paper are similar to other studies, to the extent that we find that housing wealth does not matter for retirement decisions and that labour market conditions do matter, but differ from other studies, to the extent that we find that stock market booms do not lead to earlier retirement, and may even lead to delayed retirement among those people with stock market investments. We perform a series of checks (not shown but available from the authors on request) to verify whether these results are robust.

So far, a methodological difference between this study and previous studies is that we have estimated a single hazard while other studies estimate separate hazards by sub-groups. We have replicated the approach in other studies by identifying the following sub-groups; those with only private stock market investments, those with only private personal pension arrangements, those with only private employer pension arrangements, those with all these private arrangements, and those with none of these private arrangements. There is no evidence to suggest that the previous results are a consequence of differences in the empirical approach. The relationship between stock market performance and the retirement hazard is still negative among people with stock market investments, and in particular, for the group with private personal pensions. Among this latter group, the estimated marginal effect is -0.017, which is about half the estimate in table 6 above. As the sub-group samples are much smaller, the effect of higher unemployment rates are not estimated with precision for most sub-groups, with the exception being the group with no private arrangements, where in addition a very large effect is found. For all other groups, aside from people with all types of private arrangements, where the estimated effect even turns negative, the results are very similar

in magnitude if not significance. Interestingly, a negative effect of higher earnings on retirement timing is most apparent for the sub-group with only private employer pension arrangements, where the effect is only marginally insignificant, and may hint at an accrual effects through DB pensions, as these are final salary schemes.

We also include a proxy for annuity rates for both the entire sample and the sub-groups. The value of a private pension depends upon the accumulated fund value and the conversion rate that is given when purchasing an annuity. It is therefore likely that annuity rates will matter for retirement decisions, either through wealth effects or possibly through accrual effects. However, data on annuity rates are sparse. Cannon and Tonks (2004) argue that annuity rates track the 3.5% war loan (which we use as a proxy) but this likely to be a crude proxy for two reasons. Firstly, this is a long-term interest rate and may therefore affect retirement decision for other reasons. Secondly, it is difficult to capture the plethora of annuity packages that are available to people, which differ in terms of coverage, duration, frequency of payments and payment type, with this measure. The results from this exercise are mixed. For the sample as a whole, higher annuity rates are associated with delayed retirement for people with a private personal pension (compared to others), but are associated with earlier retirement for this group in the sub-group analysis. More generally, the effect of annuity rates differs considerably across the sub-groups; it has the strongest positive association among the group with only a private employer pension and the strongest negative association among the group with all private pension arrangements. It is therefore difficult to draw any firm conclusions from this.

Another possible difference is that we identify a group invested in stock markets whereas Coile and Levine (2009) use education as a proxy for stock market investments. This difference may turn out to matter. While people with high education may or may not have stock market investments, conditional on investments, they typically have very large investments. While we better identify who has investments, our result may reflect the fact that the majority with investments have small investments and therefore may not be much affected by stock market performance. To check this we run full sample and sub-group regressions, using education level (as above) as the relevant interaction variable or sub-group. The interaction between share price growth and college education is positive, but it is not statistically different from zero, and is therefore indistinguishable from the estimated effect for the low education group (who left school at minimum legal age), which also happens to be negative. It is therefore not surprising to learn that the overall effect for this group is also not statistically different from zero in the full sample or in the sub-group sample. The effect of share price growth on retirement timing is also not larger in the years just prior to expected retirement age or when using longer-term growth rates. These results do not provide strong evidence of wealth effects.

As a further check, to explore whether we find no evidence of wealth effects because we inappropriately measure asset price shocks via the observed changes in asset prices, we use a measure of asset price 'shocks' (i.e residuals from an AR(1) model) to calculate unexpected growth rates.

However, this measure of wealth shocks does not produce any evidence of wealth effects. We also try longer-term (3-year) growth rates in asset prices, and asset price levels as opposed to growth rates but this makes little difference to our results.

Finally, we focus on men and women separately, and how the behaviour of a partner affects retirement decisions. We find that men are generally more sensitive to asset prices and labour market conditions than women are, and that women retire later when stock markets perform well if their spouse is invested in stock markets.

5 Conclusion

This paper looks at the effect of asset prices and labour market conditions on retirement timing in Great Britain. A priori, the effect of economic conditions is unclear; in an economic boom, positive wealth effects may induce earlier retirement but labour demand effects may work in the other direction. Changes in asset prices may themselves also have a potentially offsetting accrual effect, analogous to accrual or option value effects identified by Stock and Wise (1990) and Coile and Gruber (2007). We match information on share prices, and also house prices, unemployment and earnings at the local level to respondents in the British Household Panel Survey. We are able to exploit large variations in these variables over the period 1991-2007 to identify whether the 'wealth' effect dominates the accrual effect, and how the effect of asset prices compares to the effect of labour demand conditions

We find no evidence that house prices or share prices influence retirement timing through 'wealth' effects. Instead, we find that people with equity investments - specifically with pension equity investments - delay retirement *compared to others*, when the stock market performs well. This is consistent with an accrual effect, whereby people delay retirement to take advantage of future equity gains increasing the value of pension funds, and retire early to avoid prospective equity losses further diminishing fund values. However, this result holds in a relative not absolute sense - there is little evidence that people with pension equity wealth retire later overall when stock markets rise, even if they do retire later than those without pension equity wealth. With regard to labour market conditions, we find little evidence that business cycle fluctuations in earnings influence retirement decisions. However, we do find that tight labour markets lead to earlier retirement. Our estimates suggest that each percentage point increase in local unemployment rates increases the conditional probability of retirement by 0.29 percentage points.

APPENDIX

.1 Identifying who is invested in the stock market

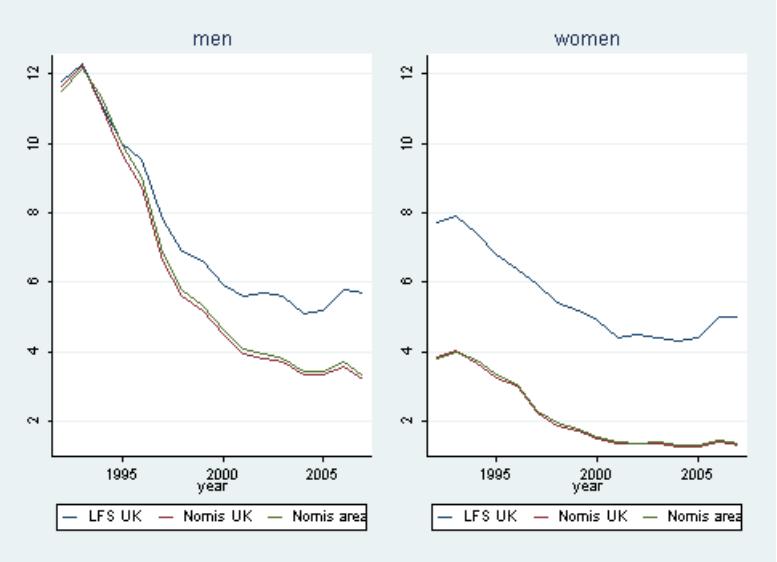
Firstly, whether the individual owns shares in 1991 is imputed by matching information in 1995 to 1991, making some adjustments to account for the fact that share ownership in 1991 was lower than in 1995 (Grout, Megginson, and Zalewska, 2009) and because matching information from older selves to younger selves leads to share ownership that is too high.[11] Secondly, the shares information is filled in between the years 1991, 1995, 2000 and 2005. For example, if someone is observed to own shares in both 1991 and 1995, 1995 and 2000, 2000 and 2005, it is assumed that they own shares in the intervening years (and likewise in the case of no shares). If someone is observed to switch share-ownership across any of these years, the year in which shares are sold (bought) is randomly assigned.[12] In spite of these efforts to match share information to other years, in 17% of person-years of people aged 50-69 share information is missing. For these cases, stock market exposure is determined entirely from information on private pensions. Where information on both share ownership and private pensions is available, 28% of individuals observed not to own a private pension own shares. 26% of individuals with missing stock market information do not own a private pension, suggesting that stock market exposure is underestimated for 7% of individuals.

[11] It is known that share ownership was 20% in 1991 and because the BHPS is a random sample of households in that year, it is assumed that 20% of the BHPS sample own shares. In 1995 just under 23% of the sample own shares so assuming that the age distribution of share ownership remains constant across these years (supporting this assumption the ratio of average share holdings by age-groups 15-34, 35-49, 50-65, and 66+ between 1995 and 2000 ranges from 0.78 to 0.81) it is possible to calculate the proportion of people by age-group who would own shares in 1991. For the age-group of interest, 50-69, the proportion that own shares in 1995 is 0.34 and taking into account the lower share ownership in 1991, it is calculated that 0.3 of this age-group would own shares in 1991. Which respondents then 'lose' shares is randomly determined. It is inevitable that some people will have owned shares in 1991 but have sold them by 1995, which is not captured by this approach.

[12] Over the three years between 1992-1994 a third are imputed to sell (buy) shares in each year and between 1996-1999 and 2001-2004 respectively, a quarter are imputed to sell (buy) shares in each year. Share-ownership in 2005 is matched to 2006, 2007.

.2 Additional tables and figures

Figure 5: A comparison of the official unemployment rate and claimant count data



Source: LFS and Nomis

Table 7: Socio-demographic variables and the condition probability of retirement

	(1) Coefficients	(2) MFX
homeowner	-0.0987	-0.5718
	(0.0914)	(0.5067)
investor	0.1093	0.5194
	(0.0940)	(0.4689)
personal pension	-0.4882***	-1.7786***
	(0.0935)	(0.2691)
employer pension	-0.1268*	-0.5938**
	(0.0682)	(0.3016)
self-employed	-0.5896***	-2.0570***
	(0.1119)	(0.2926)
public sector	-0.0037	-0.0167
	(0.0880)	(0.3967)
some further ed	-0.0415	-0.1841
	(0.0752)	(0.3273)
college ed	-0.2261**	-0.9235***
	(0.0967)	(0.3555)
female	0.5619*	3.2907
	(0.3378)	(2.4967)
nonwhite	0.1761	0.8625
	(0.1915)	(1.0137)
partner	-0.1293	-0.5515
	(0.2244)	(0.9017)
widowed	-0.3851*	-1.4668**
	(0.2079)	(0.6593)
divsep	-0.5785***	-2.4516***
	(0.1778)	(0.5712)
2 household adults	-0.4901***	-1.7841***
	(0.1867)	(0.5365)
3+ household adults	-0.6608***	-2.2370***
	(0.1972)	(0.4823)
children at home	0.0390	0.1796
	(0.1586)	(0.7425)
health probs	0.1964***	1.2121***
	(0.0244)	(0.1533)
N	15534	15534

*p<0.1, **p<0.05, ***p<0.01. Standard errors account for clustering within same area and time period. See Equation 1 for details of hazard, which also includes area fixed effects and a time trend. The baseline hazard varies by gender.
MFX refers to the percentage point change in conditional probability.

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