

Public policy and saving for retirement: Evidence from the introduction of Stakeholder Pensions in the UK

by

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Abstract

With ageing populations, OECD governments are searching for policies to increase retirement saving. In April 2001, the UK government introduced Stakeholder Pensions – a low cost retirement saving vehicle – targeted primarily on middle earners with no occupational pension. The reform also changed the structure of tax-relieved contribution ceilings, increasing their generosity for many individuals. We examine the impact of these reforms on private pension coverage using individual level micro data and a modified difference-of-differences estimator that allows for the discrete outcome variable. The results suggest that the change to the ceilings, rather than the targeting of benefits, affected private pension coverage rates.

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1. Introduction

How can households be encouraged to save for retirement? This issue is of particular importance in the United Kingdom (UK) where many households rely on private sources rather than public pensions for much of their retirement income and where there has been well-publicised concern as to the extent of any ‘savings gap’ between how much working age individuals should save for retirement and what they are actually saving (Pensions Commission, 2004). However, there is little agreement in the literature on *what* saving policies work and do not work. There has been a substantial debate around this question in the United States (see, *inter alia*, Bernheim and Scholz, 1993; Poterba, 1994; Journal of Economic Perspectives, 1996), but very little econometric evidence relating to this question for the UK despite the plethora of recent pension reforms there (see Attanasio and Rohwedder, 2003, for some findings on the impact of earlier reforms).

Greater tax incentives to encourage retirement saving are an obvious policy instrument, but it is difficult to target incentives on the marginal saver, so more generous incentives may actually reduce private retirement saving for the intra-marginal saver through a wealth effect. Moreover the exchequer cost of providing additional incentives will add to public borrowing with possible adverse effects on private saving in the aggregate (for further discussion on these issues in the UK context, see Disney, Emmerson and Wakefield, 2001; Disney, Emmerson and Smith, 2004). An alternative strategy is to develop saving instruments targeted specifically at groups in the population with inadequate retirement saving. The rationale for introducing new instruments is presumably that, for one reason or another, existing instruments are insufficiently attractive to the target group.

In this paper, we consider a reform that embodied both these policy strategies: the introduction of Stakeholder Pensions in the UK in 2001. The Green Paper (Department of Social Security, 1998) which proposed the introduction of Stakeholder Pensions argued that existing provision of private pensions was inadequate in significant respects – employer-provided pension plans predominantly covered only high earners and public sector workers whilst Personal Pensions, given their high upfront

administrative charges, were also seen as most suitable for persistent and higher income savers. It argued that:

“People on middle incomes want to save more for retirement but current pension arrangements are often unsuitable or expensive. Our new secure, flexible and value-for-money stakeholder pension schemes will help many middle earners to save for a comfortable retirement.” (*ibid*, p. 48)

The Green Paper defined ‘middle earners’ as those earning between £9,000 and £18,500 per annum. Although ‘stakeholder’ pension schemes were open to everyone, it was assumed that this target group were most likely to take-up the new retirement saving instrument. Many high earners, as mentioned, had access to other retirement saving instruments, whereas low earners were assumed to be better off contracted in to the public second tier pension (the State Earnings-Related Pension Scheme, SERPS, superseded in April 2002 by the more redistributive State Second Pension, S2P), rather than opting for a private pension arrangement. Indeed other pension reforms introduced since 2001, most notably the introduction of Pension Credit, were also intended to make public provision more generous for people with low lifetime incomes, reinforcing this last point. The main characteristics of Stakeholder Pensions, and a brief description of these related reforms, are described where pertinent later in the paper.

The Green Paper also proposed a number of other changes to the pension regime, including a reform to the structure of tax reliefs that was also subsequently implemented. Employee contributions to retirement saving accounts in the UK obtain tax relief against income tax up to a ceiling of earnings (the UK direct tax system is individual-based). Until the advent of Stakeholder Pensions, the ceiling was proportional to earnings and more generous for older individuals. An important difference between the post-Stakeholder Pension tax regime and the previous tax regime is that *all* individuals, irrespective of any earnings, are able to make gross contributions of up to £3,600 a year to their private pension. This change in tax reliefs, as we illustrate in the next section, disproportionately affects low and zero income earners. Those with very low earnings would need a source of resources in order to save in a pension, and the Green Paper briefly noted one possibility:

“The changes will also make it easier for partners to contribute to each other’s pensions, again within the overall contribution limits, should they choose to do so.” (*ibid*, p.63)

The introduction of Stakeholder Pensions therefore provided both a visible targeting of a new retirement saving instrument on a specified group and a change in the

tax regime for pensions; the latter less publicised at the time but having a potential impact on retirement saving incentives for certain groups.

The general perception in the UK finance industry and among other commentators is that the introduction of Stakeholder Pensions has been a disappointment, with low initial sales of this product and a decline in overall take-up of private pensions since 2001. In fact evidence from the Department of Work and Pensions itself (Department of Work and Pension, 2003) suggested little evidence of take-up or interest in the new product amongst the target group of middle earners who did not have an existing private pension. Although the number of holders of Stakeholder Pensions exceeded 1 million by late-2002, many of these new pension arrangements seem to have arisen from individuals switching from other schemes (notably Personal Pensions) and from existing Group Personal Pensions being reconstituted as Stakeholder Pensions. This perception led to lobbying for further changes to the private pension regime (e.g. Association of British Insurers, 2003) and to a well-publicised officially-sponsored report suggesting the need for an alternative, quasi-mandatory approach in order to encourage private retirement saving (Pension Commission, 2005).

Aggregate statistics may suggest that the reform had little effect on coverage, but of course overall trends may conceal differential effects across sub-populations. Of particular interest are the impact on coverage among the targeted group of middle earners, and the impact, if any, of the change in the structure of tax reliefs. Adverse common trends in overall private pension coverage may have dominated any ‘Stakeholder Pension’ effect, and we might not rule out the possibility that any aggregate downward trend in pension coverage might have been even greater had Stakeholder Pensions not been introduced.¹

Specifically, therefore, this paper estimates the impact of the introduction of Stakeholder Pensions on the proportion of households that have a private pension. We do not consider the impact of Stakeholder Pensions on the *volume* of retirement saving in

¹ Three specific reasons why we might have expected a decline in overall pension coverage over the period from 2000 onwards were the introduction of more generous public pensions for low income households, the decline in the return on equities (which still dominate the portfolios of pension funds) relative to other forms of investment, notably in property, and the closure of some existing defined benefit pension plans to new members. See Section 4 below.

this paper because of severe limitations in both household and aggregate data on the magnitude of retirement saving.²

The paper is structured as follows. Having described the Stakeholder Pension reform (Section 2), we look at the proportion of households with private pensions before and after the reform. There is indeed no evidence that the introduction of Stakeholder Pensions was associated with an increase in the *overall* proportion of households that saved for retirement through private pensions. However, if Stakeholder Pensions were targeted on a particular group, this aggregate result may conceal changes in coverage across earnings groups. So the paper then considers changes in pension coverage rates across the different earnings groups specified by the Green Paper using individual and household level data from the Family Resources Survey. Differential changes in coverage across income groups emerge, exactly as an analysis of a targeted policy might suggest. But we show that these differential effects are not along the lines predicted by the 1998 Green Paper, namely an increase in take-up among middle earners.

To pursue the issue further, Section 3 uses an estimator that is close to a difference-of-differences approach but which allows for the discrete nature of the outcome variable, following the method suggested in Blundell *et al* (2004). By doing so, the analysis can be extended beyond a simple ‘differences’ (i.e. before/after) analysis in order to separate common trends across groups from the differential effects on retirement saving within groups. Our results suggest that it is low earners rather than middle earners who have responded to the introduction of Stakeholder Pensions, offsetting an overall declining trend in the probability of retirement saving among the rest of the population, including middle income earners. It is these conflicting trends that are concealed by the ‘no change’ (in fact, slight decline) in the aggregate.

Why is it that increased private pension coverage among *low* earners offsets the aggregate change, rather than changes in coverage among the middle income group targeted in the Green Paper? We show why in two ways – the first by modelling the effect of spouse’s earnings on the probability of an individual’s take-up of a private pension in Section 3, the second by examining the impact of the changes in contribution

² For further discussion, see Disney, Emmerson and Wakefield (2001). In household data, measurement of saving rates is subject to a high degree of measurement error once grossed up to a comparable period (e.g. weekly, monthly, annual). Moreover, it is typically not known how much is contributed in total to occupational (company) pensions, or by employers to other forms of pension arrangement. Aggregate data are little better and there have been significant revisions to UK aggregate series on pension saving on several recent occasions.

limits on individual coverage in Section 4. We suggest that the second of the two quotes from the Green Paper cited above is the more pertinent one in explaining the effect of Stakeholder Pensions on coverage by private pensions. Our overall conclusion is that changes in the availability of saving instruments and tax incentives *do* affect saving behaviour, but that it is important to look at ‘the small print’ (in this case, the change in tax reliefs rather than the targeting) when evaluating reforms of this type.

2. Stakeholder pensions

Stakeholder pensions were proposed in the Green Paper *Partnership in Pensions* (Department of Social Security, 1998), and after some revisions in the light of consultation, introduced in April 2001. Targeted at people earning between £9,000 and £18,500 a year who did not already have a private pension, Stakeholder Pensions were intended primarily to increase the level of private pension provision among that group. Like all personal pensions, and some occupational pension schemes, Stakeholder Pensions are ‘defined contribution’ schemes, in that pension benefits depend on the accumulated value of the fund. They differ from Personal Pensions, however, in having compulsory minimum standards, a different governance structure, guaranteed workplace access for those working for moderate or large employers, and a simpler taxation structure.

Since 2001, companies employing at least five people that do not offer occupational pensions are required to: nominate a Stakeholder Pension provider after consultation with employees; provide employees with information on Stakeholder Pensions; and, channel employees’ contributions to the nominated pension provider. Neither employees nor employers are compelled to contribute to a Stakeholder Pension and indeed firms employing less than five people were completely exempted from the requirement to nominate a provider.

Stakeholder Pensions have a simple charging structure: an initial annual cap on charges was set at 1% of the fund, with no charges either upfront or on withdrawals from the fund.³ Moreover, contributors can start and stop contributing at any time and schemes have to accept all contributions of £20 or more. Compulsory minimum standards are intended to provide a greater degree of uniformity between Stakeholder Pensions offered by different pension providers than previous pension arrangements.

³ In 2004, after lobbying from the finance industry, the Treasury increased this charge cap from 1% to 1½% for the first 10 years that a product is held. For more details see HM Treasury (2004).

This, it is argued, creates a greater degree of transparency in charging structures offered by different providers and makes it easier for consumers to shop around, so increasing the downward pressure on costs. Furthermore it was also hoped that the high portability of funds held in Stakeholder Pensions (as there were to be no up-front or withdrawal charges) would also aid competition. Benchmarking would have a secondary effect on costs. By making pension providers offer a relatively uniform product it was hoped that there would be less need for individuals to seek independent financial advice before taking out a Stakeholder Pension.⁴

Overall, these features suggest that Stakeholder Pensions might be more attractive to individuals with some spare income for saving but who were wary of buying a Personal Pension given that product's high upfront charges. In addition, Stakeholder Pensions were not tarnished as a result of the bad publicity that Personal Pensions had received as a result of the 'mis-selling scandal' of the early 1990s. So, it was argued, Stakeholder Pensions would be attractive to the 'average earner' who did not have access to a company-provided pension scheme, who did not want an individually-tailored retirement saving product with high commission charges, but who had sufficient income to engage in some retirement saving.

Evidence from the financial industry suggests that *new* take-up of Stakeholder Pensions, even among the target group of middle earners, has been rather limited. British Household Panel Survey data also show that, even before the introduction of Stakeholder Pensions, take-up of private pensions among the target group was substantial, with around 80% having some form of private pension in 2000 (see Table 2.1, and also Disney, Emmerson and Tanner, 1999, for similar evidence from the early 1990s, well before the reform was announced). Table 2.1 also shows that, among middle earners in 2000, those who *did not* have a private pension were more likely to have experienced a period out of employment over the previous 9 years and when in work, on average, had lower earnings than those with a private pension. Median liquid financial assets in 1995 were just £300 among those without a private pension in 2000 compared to £1,400 among those with a private pension. Not only was the Stakeholder Pension target group relatively small, but the characteristics of those middle earners might well suggest that, if they could afford to save more, they would be better advised to save in a more liquid form for precautionary purposes rather than saving in a private pension.

⁴ These issues are discussed in Emmerson and Tanner (1999).

Table 2.1. Characteristics over the period 1992 to 2000 of ‘middle earners’ in 2000, by whether or not they have a private pension in 2000.

	No private pension in 2000	Has private pension in 2000
Sample Size	250	871
% Experiencing a period out of employment	48.4	23.8
Median earnings when employed	£13,017	£15,341
Median financial wealth in 1995	£300	£1,400
% With <£1,500 in financial assets in 1995	64.8	50.4

Source: Banks, Blundell, Disney and Emmerson (2002) using data from the British Household Panel Survey.

2.1. Contribution ceilings

A feature of the Stakeholder Pensions reform that was less discussed at the time, but which turns out to be rather important, lies in the change to contribution ceilings relative to those that applied to existing defined contribution retirement saving instruments such as Personal Pensions. Employee contributions to Stakeholder Pensions are made net of tax, with the government then contributing the equivalent basic rate tax to the individual’s scheme. Higher rate taxpayers can go on to claim more relief in line with their higher marginal income tax rate. Returns are broadly tax-exempt and pensions are then taxed at withdrawal except for up to 25% of the fund which can be withdrawn tax-free. These aspects of the tax regime broadly followed the existing regime for Personal Pensions, which also allowed tax-relieved contributions up to a maximum of earnings differentiated by age, as depicted in Table 2.2:

Table 2.2: Maximum contributions as a % of earnings by age

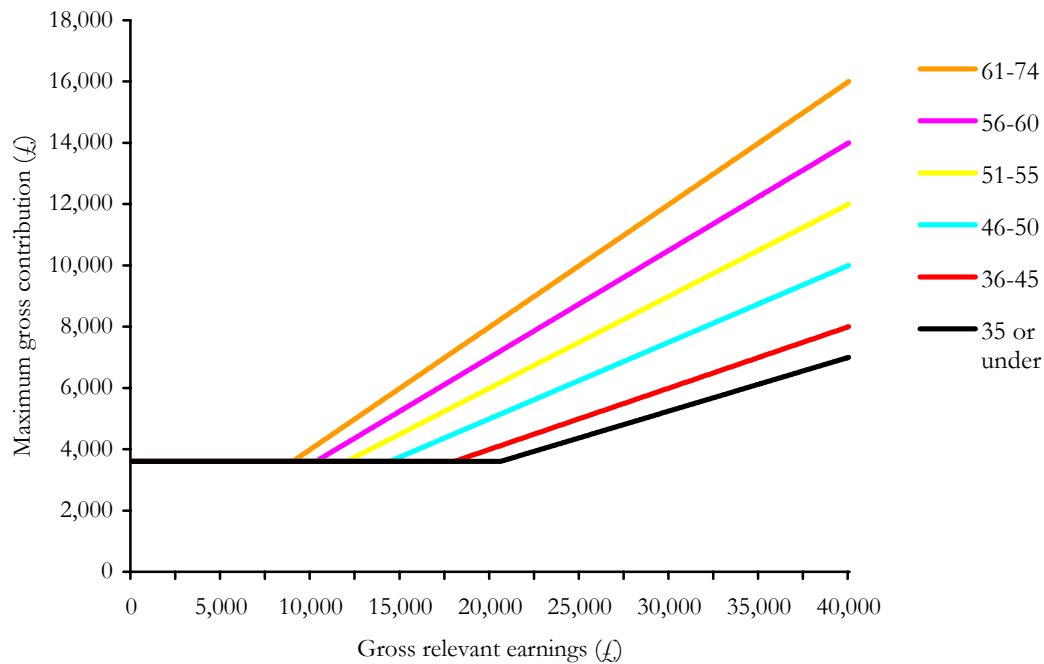
Age at start of tax year	Maximum contributions as % of earnings
35 or under	17.5%
36-45	20.0%
46-50	25.0%
51-55	30.0%
56-60	35.0%
61-75	40.0%

Notes: Contributions are subject to an overall earnings cap. In 2004-05, this has been set at £102,000. Maximum contributions include contributions by both the employer and employee.

However, an important change in the tax regime associated with the introduction of Stakeholder Pensions, applying also thereafter to Personal Pensions, is that *all* individuals, irrespective of any earnings, are able to make gross contributions of up to £3,600 a year (which for a basic-rate taxpayer would require a net contribution of £2,808). Individuals are then allowed higher contributions in line with their earnings as in

the previous regime in Table 2.2. The effect of this change is to raise contributions limits significantly for low earning individuals, especially for younger age groups (since maximum contributions as a proportion of earnings are lower). Figure 2.1 depicts the effect of the change post-2001 on the maximum gross contribution limits by gross relevant earnings for the various age groups in Table 2.2. Note that individuals with zero income can also contribute up to the £3,600 maximum, and that the UK's tax system is individual-based so that each individual in a couple can contribute up to this maximum.⁵

Figure 2.1. Maximum annual gross contribution limit, by annual gross relevant earnings and age, Stakeholder Pension tax regime



3. Empirical analysis

3.1. Data sources and descriptive analysis

This section investigates the determinants of the household decision to save for retirement using information from the Family Resources Survey (FRS). The FRS is a large-scale repeated cross section of households designed to elicit information on household characteristics, income and other economic circumstances. The FRS asks individual respondents who are in work or who have ever worked (below age 65) whether they or their employer contributes to a pension scheme. The pension

⁵ Clark and Emmerson (2003) discuss other features of the tax treatment of Stakeholder Pensions, in particular in relation to Individual Saving Accounts (ISAs). An even more sweeping reform to the ceilings on pension contributions will be introduced in April 2006. Under the new provisions, there will be an annual limit on contributions of 100% of earnings up to a ceiling of £215,000 (with the floor of £3,600 remaining) and a new lifetime limit on the value of the pension fund of £1.5m.

arrangements are delineated as a ‘personal/private’ pension, a company-run pension scheme, a stakeholder pension or some other arrangement.⁶ Table 3.1 Panel A provides data from the Family Resources Survey for the (tax) years 1999–2000 to 2002–03 on pension holdings by type. According to the table, overall coverage by private pensions has declined slightly over the period. Coverage by employer-provided plans has been constant, and a decline in coverage by Personal Pensions has been not quite offset by the introduction of Stakeholder Pensions and by a slight rise in the number of people with multiple plans.

Panel B reveals the striking finding that coverage has fallen among the high and medium earnings groups over the period (these are the bands delineated by the Green Paper, of £18,500+ and £9,000 to £18,500 respectively), and among the self-employed.⁷ Coverage has *risen* among low earners and even (marginally) among those reporting zero earnings who are below state pension age. At first sight, these combined findings from Table 3.1 are paradoxical given the intentions stated in the Green Paper. They suggest that the introduction of Stakeholder Pensions has had no effect on overall coverage and indeed coverage by any kind of pension has fallen among the ‘target’ group of middle earners. Nor can these declines be explained by a decline in employer-provided occupational pension provision, since this remains constant. Finally, despite the Green Paper suggesting that low earners might be better off in the second pillar state scheme, this is the only group to see a substantial increase in private pension coverage.

⁶ In addition respondents are asked whether the scheme is contributory or non-contributory, when they joined it and if it is ‘portable’, as well as more detailed questions about own contributions, contracted-out rebates paid into a Personal or Stakeholder Pensions (since individuals can have such schemes without making any additional contributions) and, in the case of a Stakeholder Pension, whether it was organised by the employer or the respondent. As a cross check, we examined responses from the General Household Survey (GHS), which asks somewhat different questions, primarily about coverage and membership, and also looks at aggregate data on pension scheme membership and contributions from Inland Revenue sources. The FRS provides detailed information on contributions, unlike the GHS, but this emphasis of contributions leads the FRS to give slightly lower coverage rates than GHS, especially for Personal Pensions where many individuals are not making contributions to their own pension arrangement. Both household surveys give significantly lower numbers for pension coverage and (more significantly, in the case of the FRS) for contributions than aggregate data from the Inland Revenue, perhaps reflecting undersampling in household surveys of contributors who make large contributions (i.e. the rich) and of other groups who may be contributing but are not asked about their contributions in the survey. However, it can be noted that aggregate data on total pension saving has been heavily revised downwards in recent years (although this applies more to data reported by the Office of National Statistics).

⁷ We gross up weekly earnings data to provide these annual earnings bands. This inevitably produces measurement error - for example some people will wrongly be attributed ‘zero’ earnings for the year based on current zero earnings. In addition, the Green Paper sometimes refers to ‘£20,000’ and sometimes to ‘£18,500’ as the highest income of ‘middle earners’. In general we work with the latter definition in the FRS data, revalued over time in line with earnings growth.

**Table 3.1: Pension coverage by type of pension and earnings band
1999/00 to 2002/03**

Panel A: Employees only

<i>Year</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>Δ99-02</i>
Type of pension:	%	%	%	%	%point
Personal Pension	11.3	10.3	9.8	8.4	- 2.9
Stakeholder pension	0.0	0.0	0.8	1.2	+ 1.2
Occupational pension	47.9	47.9	48.0	48.1	+ 0.2
<i>Combined</i>	1.9	2.0	2.2	2.4	+ 0.4
Aggregate coverage (%)	<i>61.2</i>	<i>60.2</i>	<i>60.7</i>	<i>60.2</i>	<i>- 1.0</i>
Sample size	<i>20,829</i>	<i>20,010</i>	<i>21,655</i>	<i>22,939</i>	<i>85,433</i>

Panel B: All employees of working age

<i>Year</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>Δ99-02</i>
<i>Coverage by earnings band</i>	%	%	%	%	%point
Zero	3.4	3.6	3.5	3.6	+ 0.1
Low	35.0	35.5	36.9	36.6	+ 1.6
Medium	69.7	68.7	68.8	67.3	- 2.4
High	86.9	86.3	85.7	84.6	- 2.4
Aggregate coverage (%)	<i>44.4</i>	<i>44.1</i>	<i>44.7</i>	<i>44.4</i>	<i>0.0</i>
Sample size	<i>29,351</i>	<i>27,927</i>	<i>30,071</i>	<i>31,813</i>	<i>119,162</i>

Note: The sample includes individuals between school leaving age and state pension age, although a few individuals have to be excluded due to missing data. The sample in Panel B is that used for the regressions reported in later sections. Rounding explains why figures in the right-hand column may be slightly different from the difference between the 1999 and 2002 columns.

Source: own calculations, Family Resources Survey 1999/00 to 2002/03.

Table 3.2 provides some evidence on how this distribution of coverage across earnings bands affects aggregate retirement saving. It depicts contribution shares by earnings band, matching Inland Revenue data to the Family Resources Survey household data for 2001-02.⁸ Given the disproportionate share of total contributions made by earners in the highest band, under-representation of the most well-off in household surveys may therefore be one reason why these surveys tend to report lower aggregate saving, and also shows how aggregate saving rates are disproportionately sensitive to the behaviour of high earners. A fall in coverage by private retirement saving arrangements among high earners (as depicted in Table 3.1) therefore could potentially have a substantial effect on aggregate retirement saving.

Table 3.2: Proportion of earners and private pension contributions

⁸ Since we are working in 2002 prices, we uprate the DSS stakeholder pension bands in line with inflation, which gives band values of £9,723 and £19,985 that we round up to £10,000 and £20,000.

by earnings band, 2001-02

<i>Earnings band</i>	(1) <i>% of sample</i>	(2) <i>% of total contributions</i>
£0 to <£10,000	36.6	9.3
£10,000 to <£20,000	45.1	26.4
£20,000 to <£30,000	12.6	22.4
£30,000+	5.7	41.2

Sources: (1) own estimates from Family Resources Survey; (2) published Inland Revenue data.

3.2. The modelling procedure

Given the targeting of the pension reform, we write a model of retirement saving as:

$$P_{it} = \theta Z_i + d_t + \gamma' X_{it} + \alpha Z_i I_t + \varepsilon_{it} \quad (1)$$

where P_{it} is the probability of an individual purchasing a private pension, Z_i is a vector delineating the earnings group in which the individual is located ('high', 'medium', 'low' or zero, as described previously), d_t is a time dummy, X is a vector of covariates, and θ , γ and α are vectors of parameters. I_t is an indicator variable for the period during which Stakeholder Pensions were available (from 2001 onwards). Relating the coefficient on the 'treatment' to the earnings group, α , permits the effect (if any) of the introduction of Stakeholder Pensions on the probability of purchasing a private pension to vary across earnings groups, which is what we want to test. Our counterfactual is that, in the absence of the reform, the purchase probabilities for the different groups would have followed a common trend.

The modelling procedure should allow for the discrete nature of the outcome variable, as the probability of retirement saving must have a lower bound of zero (and in principle a ceiling of 100% certainty of purchase) otherwise the model might predict that, for example, those with zero earnings have a negative probability of retirement saving. The standard solution when estimating a non-linear model such as the probit (used here) is subject to the *caveat* that the calculated 'marginal effects' on the interaction terms that are automatically generated⁹ do not give a 'true' measure of the 'policy effect' analogous to the coefficients from a linear model. Furthermore, within the setup for a discrete outcome, the common trends assumption may not hold for the expectations (the saving probabilities) but for a transformation of the distribution of the outcome variable: specifically for the inverse probability function, Φ^{-1} (for the probit). In other words, the

⁹ Here, by STATA version 8. For more details see Ai and Norton (2003).

assumption of common trends is made for the index rather than for the probability itself. Following Blundell *et al* (2004) this can be written formally as saying that in the absence of any ‘treatment’ the following would hold:

$$\begin{aligned} \Phi^{-1} [E(P_{it} | X_{it}, Z=i, I=1)] - \Phi^{-1} [E(P_{it} | X_{it}, Z=i, I=0)] = \\ \Phi^{-1} [E(P_{it} | X_{it}, Z=high, I=1)] - \Phi^{-1} [E(P_{it} | X_{it}, Z=high, I=0)] \end{aligned} \quad (2)$$

The right hand side of this equality can be estimated from observations of the control (here, the high income) group before and after the introduction of stakeholder pensions. Using the common trends assumption as it is now formulated, this information can in turn be used to construct a counterfactual of how the index would have evolved for each treatment group individual had stakeholder pensions never been introduced. The impact of the policy can then be evaluated as¹⁰:

$$\begin{aligned} I(X) = E(P_{it} | X_{it}, Z=i, I=1) - \Phi \{ \Phi^{-1} [E(P_{it} | X_{it}, Z=i, I=0)] + \\ \Phi^{-1} [E(P_{it} | X_{it}, Z=high, I=1)] - \Phi^{-1} [E(P_{it} | X_{it}, Z=high, I=0)] \} \end{aligned} \quad (3)$$

Blundell *et al* (2004) propose a method for implementing this ‘difference-of-differences’ estimator of the effect of the policy. A different relationship between the outcome and the observables is estimated for groups of agents defined according to income group and ‘pre’ or ‘post’ the stakeholder reform. Such relationships encapsulate the behavioural patterns of each group and the impact of the stakeholder reform once it had been enacted. By predicting the outcomes for the treated (i.e. lower income after) groups using the behavioural equations for the higher income group, one obtains an estimate of how the underlying index would have changed for individuals in the treated group in the absence of stakeholder pensions. This can be used in combination with the behavioural equations for the lower income groups to construct the estimated effect (3). The final estimate of the effect uses predictions made for the actually treated groups and weighted according to characteristics (X) in these groups. It can therefore be thought of as representing the average impact of treatment on the treated.

3.3. *Econometric results: Model in differences*

Before moving to the ‘treatment’ framework, Table 3.3 provides a simple model (‘in differences’) of the probabilities of respondents purchasing any private pension

¹⁰ Despite the similarity to the linear case, the nonlinear assumption exploited here entails two additional restrictions on the nature of the error terms: only group effects are allowed for and the groups being compared are assumed to have the same residual variance. See Blundell *et al, ibid*, p.580.

(whether provided by the individual's employer or by an insurer), using data from the Family Resources Survey 1999–2000 to 2002–03. We exclude the self-employed from the sample to reduce the number of interactions, although the results are not thereby altered.¹¹ The mean probability of purchasing a private pension is 44.4%. The model simply relates this probability of purchase to underlying characteristics and a time trend. A key issue is how this probability varies across the earnings groups (zero, 'low' i.e. $>£0$ to $<£9,000$, 'medium' i.e. $£9,000$ to $<£18,500$, and 'high' i.e. $£18,500+$). The marginal effects can be directly interpreted as the responses to changing characteristics¹², given that the model is in differences.

The model shows a rising probability of having a private pension with age up to age 54. Relative to the default group (less than 25), 25-29 year olds have a 19.3ppt increased probability of contributing to a private pension, and 30-34 year olds a 31.1ppt increased probability. Thereafter, with rising age, the probabilities remain roughly constant. Men are just under 5ppt less likely to buy pensions, other things being equal (a crucial *caveat*) – this may reflect the longer life time expectancy of women – and a member of a couple is more likely to buy a pension, perhaps again reflecting the possibility of receiving an inherited pension on the death of a spouse or else of self-selection by marital status. As expected, higher educational attainment is associated with greater probability of purchasing a private pension.

The next set of coefficients is of particular interest. First, the year dummies are negative (relative to 1999–00) and significant for 2002–03 suggesting, on average, a 1.7ppt lower probability of contributing to a private pension in 2002–03 relative to 1999–00. This reflects the downward trend noted in Table 3.1, although only the fall in the last year is statistically significant at conventional levels. Second, Table 3.3 shows, as might be expected, that the level of earnings is an important predictor of purchase of a private pension: relative to the high earnings group, a middle income earner is 15ppt less likely, a low earner 39ppt less likely and a zero earner 67ppt less likely to purchase a private pension. Again, these marginal effects can be compared with the comparisons of averages in Table 3.1. Finally, the higher the partner's earnings, the more likely that the individual will purchase a private pension.

¹¹ Results including the self-employed are available on request.

¹² Evaluated at the mean level of the dependent variables.

Table 3.3: Probability of having a private pension: Model in differences

<i>Variable</i>	<i>Coeff.</i>	<i>DF/dx</i>	<i>Std.Err.</i>
Age 25-29	0.493**	0.193	0.020
Age 30-34	0.800**	0.311	0.020
Age 35-39	0.904**	0.349	0.019
Age 40-44	0.949**	0.365	0.020
Age 45-49	1.025**	0.391	0.021
Age 50-54	1.011**	0.386	0.021
Age 55-59	0.926**	0.356	0.022
Age ≥60	0.743**	0.290	0.030
Male	-0.047**	-0.017	0.010
Couple	0.155**	0.058	0.011
GSCE or below	-0.300**	-0.114	0.012
'A' Level or below	-0.083**	-0.031	0.013
Year=2000	-0.017	-0.006	0.013
Year=2001	-0.012	-0.005	0.013
Year=2002	-0.045**	-0.017	0.012
Zero Earnings	-2.740**	-0.664	0.019
Low earnings	-1.240**	-0.390	0.016
Mid earnings	-0.412**	-0.153	0.015
Partner's earnings	0.003**	0.001	0.0003
Log Likelihood		-52,619.4	
No. of obs.		119,162	

Notes: Source – Family Resources Survey. Defaults are graduate aged under 25, female, single, year 1999–00 with high earnings. ** = 1% significance, * = 5% significance. Coefficient on constant omitted.

dF/dx coefficients can be interpreted as 'marginal (policy) effects' – see text.

3.4. *Econometric results: Model in 'Quasi-difference-of-differences'*

We now move to the 'treatment' model, the results of which are reported in Table 3.4. The results are labelled 'Quasi-difference-of-differences' because they use the introduction of Stakeholder Pensions as the 'treatment', as summarised in text equation (1). Estimating (1) allows us to compare coefficient with those from the 'model in differences' in Table 3.3, and also gives a fuller impression of whether there are important differences across earnings groups.

Column (1) provides the coefficients from the model described in text equation (1). Coefficients on characteristics in the 'difference-of-differences' specification are broadly the same as before, although those attached to earnings level are slightly larger in magnitude. It is also interesting to notice that the year effects become more strongly negative for 2001 and 2002, and both are now highly significant whereas this was only true for the later year in the model in differences in Table 3.3. This reflects the fact that

with the interaction terms included these coefficients are driven by the decline in coverage amongst high earners (the omitted earnings group), and we have seen that this group had a relatively large decline in coverage (see Table 3.1).

Inspection of the ‘treatment’ coefficients – the interaction of earnings level with the dummy variable identifying the years after Stakeholder Pensions were introduced – would suggest that the policy had no significant impact on coverage among middle-income earners. In contrast, the coefficients for the analogous interaction terms for low-income earners and zero earners are significant (at 1% and 5% levels respectively) and suggestive of effects offsetting the negative time trend.

As suggested in Section 3.2, the ‘true’ treatment effects of the introduction of Stakeholder Pensions cannot be ‘read off’ from the marginal effects that would be associated with these reported coefficients. Using the Blundell *et al* (2004) procedure described in that sub-section, these effects can be calculated as:

zero earnings group:	0.3ppt (0.4ppt)
low earnings group:	3.6ppt (1.7ppt)*
middle earnings group:	1.6ppt (1.1ppt)

(standard errors in brackets, estimated by bootstrapping with 1,000 repetitions).

These results indicate that the largest and most significant impact of Stakeholder Pensions relative to trend (of around 3.6 percentage points) has been on low earners. The impact of the reform on those with zero earnings was overstated by the standard errors in Table 3.4, and we also find no significant effect on middle earners. Thus the results effectively confirm the descriptive patterns in the second panel of Table 3.1.

**Table 3.4: Probability of having a private pension:
Quasi-difference-of-differences**

Variable	(1)		(2)	
	<i>Own earnings band</i>		<i>Own+spouse's band</i>	
	<i>Coeff.</i>	<i>Std.Err.</i>	<i>Coeff.</i>	<i>Std.Err.</i>
Age 25-29	0.493**	0.020	0.486**	0.020
Age 30-34	0.799**	0.020	0.797**	0.020
Age 35-39	0.904**	0.019	0.906**	0.020
Age 40-44	0.949**	0.020	0.951**	0.020
Age 45-49	1.025**	0.021	1.029**	0.021
Age 50-54	1.011**	0.021	1.022**	0.021
Age 55-59	0.926**	0.022	0.945**	0.022
Age ≥60	0.742**	0.030	0.767**	0.030
Male	-0.048**	0.010	-0.015	0.010
Couple	0.155**	0.011	0.091**	0.012
GSCE or below	-0.300**	0.012	-0.295**	0.012
'A' Level or below	-0.083**	0.013	-0.083**	0.014
Year=2000	-0.017	0.013	-0.016	0.013
Year=2001	-0.079**	0.026	-0.071*	0.032
Year=2002	-0.111**	0.026	-0.105**	0.031
Zero Earnings	-2.783**	0.027	-2.780**	0.032
Low earnings	-1.303**	0.023	-1.313**	0.028
Mid earnings	-0.440**	0.021	-0.474**	0.025
Partner's earnings M/H	0.003**	0.0003	0.098**	0.039
Zero E*StakePen	0.080*	0.036	0.051	0.044
Low E*StakePen	0.120**	0.029	0.081*	0.036
Mid E*StakePen	0.040	0.028	0.031	0.034
Zero E*Partner's earnings M/H	-	-	0.088	0.057
Low E*Partner's earnings M/H	-	-	0.030	0.045
Mid E*Partner's earnings M/H	-	-	0.102*	0.044
StakePen* Partner's earnings M/H	-	-	-0.015	0.052
Zero E*StakePen*Partner's earnings M/H	-	-	0.077	0.079
Low E*StakePen*Partner's earnings M/H	-	-	0.093	0.061
Mid E*StakePen*Partner's earnings M/H	-	-	0.020	0.060
Log Likelihood	-52,607.6		-52,503.7	
No. of obs.	119,162		119,162	

Notes: Source – Family Resources Survey; Defaults are graduate aged 20-24, female, single, year 1999–00 with high earnings, partner has zero or low earnings. Coefficient on constant omitted.

** = 1% significance, * = 5% significance.

'Zero E*StakePen' = individuals with zero earnings interacted with a dummy for the Stakeholder pension 'regime' (post April 2001). 'Zero E*Partner's earnings M/H' = individuals with zero earnings interacted with dummy for whether spouse had medium or high earnings. Other interactions have similar interpretations.

3.5. Further analysis: the role of spouse's earnings

The results so far are inconsistent with the 'targets' in the Green Paper – the aggregate comparisons in Table 3.1 and the marginal effects in the results in Tables 3.3

and 3.4 column (1) suggest that low and even zero earners may have increased the take-up of private pensions after the reform, although overall coverage remains very low for this last group and the calculations of the ‘true’ difference-of-differences estimator using the Blundell *et al* 2004 calculation and formulation of common trends also casts some doubt on the zero earner finding. Nevertheless, *any* finding, however tentative which suggests that people with zero or low earnings increasingly took out private pensions is somewhat surprising (unless they have substantial unearned income).

The result becomes less surprising when we consider the fact that *each* individual in a household can invest up to the ceiling in a Stakeholder Pension, irrespective of their own income. The results are consistent with the idea that some low earners in the household have taken out Stakeholder Pensions because the household was previously constrained by the effective limit on the value of retirement saving arising from the contribution ceiling (see Figure 2.1). Thus the replacement of the cap as a proportion of earnings by the single figure (£3,600) may lie behind this change. So, for example, a spouse with low or even zero earnings can invest up to the limit in a Stakeholder Pension if there are sufficient resources in the household as a whole. If Stakeholder Pensions are simply used by the household as a device for engaging in relatively tax-favoured saving (given other ceilings such as annual contribution limits on ISAs) this might be seen as an undesirable by-product of the reform. On the other hand, it could be argued that a policy that, for example, redistributed pension resources from a rich partner to a spouse with low lifetime individual income was socially desirable (a point recognised in the second quote from the Green Paper in Section 1). This also generates a specific testable prediction: if we include spouse’s earnings among the explanatory variables, the probability of a low (or zero) earner contributing to a pension in the Stakeholder Pension regime should be *positively* related to the spouse’s earnings.

The model where we allow for spouses’ earnings is written as:

$$P_{it} = \theta Z_i + \pi S_i + d_t + \gamma X_{it} + \alpha Z_i I_t + \beta S_i I_t + \lambda Z_i S_i + \phi Z_i S_i I_t + \varepsilon_{it} \quad (4)$$

where all variables are defined as before except S which is an indicator variable of the income band of the spouse of individual i . We are now interested not just in the coefficient vector α but also in the coefficients ϕ which measure the impact of the spouse’s income band on the retirement saving probability of an individual in a given income band. Again, we use the Blundell *et al* method to calculate the ‘treatment’ effects for this more complex specification. However, because we now have many more

interactions, we simplify the modelling of partner's earnings so that these are either Zero/Low (i.e. below £9,000) or Medium/High (i.e. £9,000 and above). This coarser grouping seems reasonable as it differentiates inactive or low paid spouses (e.g. part-time workers) from full-time or better paid working spouses. However, we maintain the four-way distinction for individual earnings.

Table 3.4 column (2) presents the results. Most of the coefficients on characteristics are similar to the estimates in column (1). The coefficient on gender is no longer significant, now that we have allowed for interactions of partner's earnings and each individual's own earnings band. The year dummies have slightly lower coefficients but still suggest a significant downward trend in the aggregate probability of purchasing a private pension over time.

The coefficients on the interactions are of most interest, although few are now individually significant. For example, only the low earnings 'treatment' (interaction with the dummy identifying the post-stakeholder period) is significant, confirming that the effect on non-earners is not very robust, at least without consideration of partner's earnings. To interpret the coefficients on the interactions, we carry out joint tests of significance for each of the (Z_i) earnings groups in turn. For each group, we test the joint significance of the pair of coefficients:

“($Z_i = X$) * After stakeholder” and

“($Z_i = X$) * After * Partner mid/high earnings”

The null hypothesis is that the pair of coefficients is jointly zero. Our results are:

For $Z_i =$ zero earnings, rejects null at 10% level, p-stat 0.0725.

For $Z_i =$ low earnings, rejects null at all conventional levels, p-stat 0.0001.

For $Z_i =$ mid earnings, *cannot* reject null at conventional levels, p-stat 0.4004.

The results suggest that it is low earners with partners with middle/high earnings and, rather less robustly, zero earners with similar partners, who were affected by the reform. Middle earners were unaffected. We can identify whether there are significant 'treatment' effects using the Blundell *et al.* (2004) procedure described previously.

These additional 'treatment' effects for being in the post-stakeholder period and including spouse's earnings brackets are as follows:

zero earnings group with zero/low earning partner:	0.1ppt (0.3ppt)
zero earnings group with medium/high earning partner:	1.1ppt (0.8ppt)
low earnings group with zero/low earning partner:	2.6ppt (1.6ppt)
low earnings group with medium/high earning partner:	5.2ppt (2.3ppt)*

medium earnings group with zero/low earning partner: 1.7ppt (1.3ppt)
 medium earnings group with medium/high earning partner: 1.4ppt (1.4ppt)

(*standard errors in brackets, estimated by bootstrapping with 1,000 repetitions*).

This result confirms that the impact of the introduction of Stakeholder Pensions is strongest amongst low income earners who have a high or medium earning partner, suggesting that the change to the contribution limits has allowed families with higher joint earnings to utilise the new arrangements to increase the tax-relieved component of their retirement saving. This is most likely to explain the increase in coverage among this group of earners. Without this impact, the analysis suggests, coverage by private pensions would have declined even more after 2001.¹³

4. Contribution limits: a direct test, and sensitivity analysis

4.1. Testing the effect of contribution limits

The previous analysis suggested that the change in the contribution limits, rather than the targeting of the reform on particular groups of earners, has had an impact on take-up of private pensions. However the test of that proposition was indirect. We now provide a more direct test of the contribution limit hypothesis. This is a simpler ‘treatment’ to evaluate insofar as the contribution limits are individual and we do not need to control explicitly for earnings bands or either sampled individuals or their partners (although we could choose to do so).

In similar vein to (1), we can therefore write the limit model as:

$$P_{it} = \psi L_i + d_t + \gamma X_{it} + \zeta L_i I_t + \varepsilon_{it} \quad (5)$$

where L is an 0-1 indicator variable of whether the individual’s annual earnings are above or below the pre-April 2001 contribution limit (which depends on their age and earnings, as discussed in section 2.1) and where ψ , γ and ζ are parameters. The last parameter, in particular, measures the impact of the introduction of Stakeholder Pensions (I_t) on take-up of private pensions *via* its impact on contribution limits. We can also differentiate the effect of contribution limits on zero and low earners by introducing an indicator variable for ‘zero’, and the appropriate interactions, to examine whether there is

¹³ When we split our ‘control’ (high earning) group into those with partners with medium/high *versus* low/zero earnings, this general result holds in terms of coefficient values, although the additional regressors raise the overall standard errors of the estimates.

any disproportionate impact on this category relative to low earners below the flat contribution ceiling of £3,600.

Before examining the results, we return to a *caveat* mentioned in footnote 6. We are grossing up weekly earnings in the FRS to obtain annual earnings, so our indicator of whether the individual is affected by the change in contribution limits has measurement error. Moreover, we do not know whether the individual is contributing up to the limit before (or indeed after) the reform given the inadequate data on actual total contributions by any individual to his or her pension plan (for the reasons described in footnote 2). Of course this constraint on total contributions is most obviously applicable for zero earners prior to the introduction of Stakeholder Pensions, when no individual should have been contributing to a Personal Pension and receiving tax relief – see Figure 2.1.¹⁴ For individuals with low positive earnings who were not contributing to a pension before the Stakeholder Pension reform, the large rise in the contribution limits may have triggered the take-up of a private pension, since the higher value of tax-relieved contributions would now outweigh the threshold costs of purchasing a pension when the individual was previously able only to make small values of tax-relieved contributions to the scheme.

Table 4.1 provides the econometric results for this exercise. Column (1) aggregates the ‘Stakeholder Pension’ effect across both earners below the limit and those with zero earnings whilst Column (2) separates these effects. Among the covariates, the main difference from Tables 3.3 and 3.4 is that the negative time trend in take-up of private pensions becomes more strongly significant, given that we no longer differentiate among earning groups. Of the variables associated with the limits, the results confirm that low and, especially, zero earnings are negatively associated with purchase of a private pension. The interaction of ‘earnings below the contribution limit’ with the introduction of Stakeholder Pensions is positive, as predicted, and significant at the 5% level, confirming the hypothesis of a contribution ceiling effect.

¹⁴ Table 3.1 nevertheless suggests that we observe a few individuals who are contributing pre-2001, which largely arises (we surmise) because they had some earnings during the year even though we observe zero current earnings in the FRS. This measured proportion of take-up among zero earners pre-2001 may be taken as an upper bound on the measurement error involved in grossing up weekly earnings to obtain annual earnings, both before and after the reform, under certain assumptions discussed below.

**Table 4.1: Probability of private pension by contribution limits:
Quasi-differences-of-differences**

Variable	(1) <i>by income < limit</i>		(2) <i>by income < limit & 0</i>	
	Coeff.	Std.Err.	Coeff.	Std.Err.
Age 25-29	0.651**	0.019	0.650**	0.019
Age 30-34	0.931**	0.019	0.931**	0.019
Age 35-39	0.980**	0.019	0.980**	0.019
Age 40-44	1.017**	0.020	1.016**	0.020
Age 45-49	1.022**	0.021	1.022**	0.021
Age 50-54	0.925**	0.021	0.925**	0.021
Age 55-59	0.761**	0.022	0.761**	0.022
Age ≥60	0.454**	0.030	0.454**	0.030
Male	0.157**	0.010	0.157**	0.010
Couple	0.156**	0.011	0.156**	0.011
GSCE or below	-0.401**	0.012	-0.401**	0.012
'A' Level or below	-0.145**	0.014	-0.145**	0.014
Year=2000	-0.045**	0.013	-0.045**	0.013
Year=2001	-0.097**	0.022	-0.097**	0.022
Year=2002	-0.127**	0.022	-0.127**	0.022
Partner's earnings	0.002	0.0003	0.003	0.0003
Zero earnings	-1.843**	0.045	-1.861**	0.045
Earnings below limit	-0.748**	0.018	-0.738**	0.018
Below limit*StakePen	0.049*	0.022	0.045*	0.022
Zero earnings*StakePen	-	-	0.036	0.029
Log Likelihood	-54,930.3		-53,842.9	
No. of obs.	119,162		119,162	

Notes: Source – Family Resources Survey; Defaults are graduate aged 20-24, female, single, year 1999–00 with earnings above limit. Coefficient on constant omitted.

** = 1% significance, * = 5% significance.

'Below limit*StakePen' = individuals with earnings below limit interacted with a dummy for the Stakeholder pension 'regime' (post April 2001). Column (2) coefficients have similar interpretations.

To estimate the 'treatment' effect we utilise the procedure of Blundell *et al* (2004) for which we get the following results:

Had a limit increase: 2.4ppt (0.9ppt)*
 Had a limit increase and zero earnings: 0.6ppt (0.3ppt)*
 Had a limit increase and positive earnings: 3.3ppt (1.4ppt)*

(standard errors in brackets, estimated by bootstrapping with 1,000 repetitions).

These results therefore suggest that there was a significant positive impact on purchase of private pensions arising from the increase in the contribution limits in 2001 for low and zero earners, especially among those with some earnings. As Table 3.4

column (2) suggests, most of these individuals were likely to have been spouses of better-off earners but, from Table 3.1, this increase in purchases was not sufficient to offset the adverse overall trend in take-up of private pensions over the period. Nevertheless, it would be erroneous to conclude from the aggregate data, or from the emphasis in the Green Paper on ‘middle earners’, that the policy reform had no effect.

4.2. *Alternative explanations*

It is well known that the ‘common trends’ assumption lies at the heart of the ‘difference-of-differences’ model. Here we have two models: in the first, we assume that the trend in coverage among high earners would have been replicated among all other earnings groups in the absence of the reform, whilst in the second we assume that the behaviour of those above the contribution ceiling would have determined in the same way as that of those below the ceiling in the absence of the tax reform. How plausible are these assumptions?

First, we can ask whether there is any reason to believe that the behaviour of high earners (who we assumed to be the ‘control’ given their existing high coverage by private pensions) would have been different from other earnings groups. There is no other policy reform that is pertinent here, such as a change in the structure of marginal tax rates. Perhaps of more pertinence in explaining falling overall pension coverage by pension schemes (Table 3.1) is the change in the financial climate from the beginning of 1998 to the end of 2002, during which the FTSE 100 fell by 31% whereas house prices rose by almost exactly 50% (using the Halifax plc index). This might have induced savers to switch away from pension funds (which were at this stage largely equity-dominated) to investment in housing stocks. So if high earners exhibited greater substitutability in their asset portfolios, either from economies of scale or greater financial acumen, this might explain the disparate trends. However such a ‘story’ finds it hard to explain similar trends in pension coverage among high and middle earners, and nor does it explain the result when the contribution limits are modelled rather than the earnings bands.

Alternatively, we can focus not on the control group but on the group for which the ‘treatment effect’ is most marked: low earners. Here there *is* an important change in the tax and benefit regime that coincides with the introduction of Stakeholder Pensions in 2001. As described in Section 1, the period saw the replacement of SERPS, the second tier pension, by the State Second Pension (S2P – introduced in April 2002 but announced in the 1998 Green Paper). S2P is more explicitly redistributive towards low

lifetime earners in its design. In addition the means-tested benefit for pensioners, known as the Minimum Income Guarantee (MIG), was consistently indexed to earnings rather than prices throughout the late 1990s and early 2000s (unlike the rest of the pension programme), so increasing its real value for low earners and reinforcing the disincentive to save for retirement. In a final important development, the MIG was renamed the ‘Pension Credit Guarantee’ (PCG) in October 2003, and a new ‘Pension Credit Savings Credit’ introduced for families containing an individual aged 65 or over. This last reform essentially reduced the withdrawal rate from 100% to 40p in the pound for families with an individual aged 65 or over who was in receipt of a full Basic State Pension but thereby increased dramatically the coverage of means-tested benefits among the pensioner population. Analysis of all these trends suggests that, whereas replacement rates cohort-by-cohort for the public pension programme have already peaked for average earners, low earners are likely to see increasingly generous replacement rates from the public programme for several decades yet (Disney and Emmerson, 2005).

This analysis suggests that, if anything, we might expect coverage among low earners (at least, for those who understood the implications of all these reforms) to fall *faster* than that for high and middle earners. In fact, we have found the reverse, suggesting that our estimate of the ‘treatment effect’ may if anything be a lower bound on the effect. However, this interpretation does not explain the result for low earners who have a high or middle earning partner, who might not be eligible for income-tested benefits (levied on a household basis rather than an individual basis), or the result using contribution limits. Overall, we believe that the ‘story’ adduced in this paper for the ‘treatment effect’ is the most plausible one.

4.3. *Changes in the composition of households in earnings bands*

Another possible alternative explanation for the ‘treatment effect’ lies in changes in the composition of households within earnings bands. Suppose, for example, that earnings volatility grew over the period. At the beginning of the period, in this scenario, the rich were persistently rich and the poor persistently poor. Assume that by the end of this period, there had been greater mobility so that the lower earners contained a larger fraction of transient rich, and *vice versa*. If the rich, irrespective of current situation, tended to take-up private pensions while the poor did not, a greater number of transitions would lead to some slight convergence in take-up rates, which is in fact what we observe in Table 3.1 and the subsequent analysis.

Given that the FRS is not a panel, we cannot test for greater earnings volatility over the period (although we find little evidence of it from some experiments with the BHPS and the rotating panel element of the Labour Force Survey). So we test the proposition using the FRS in an manner designed to test for common and differential trends across earnings groups. We pool each ‘treatment’ group (medium/low/zero earnings) sequentially with the ‘control’ (high earnings) group. Now write the model:

$$I_{it} = \theta Z_{i=high} + \gamma_1' X_{it} + \gamma_2 W_{it} + \alpha_1' X_{it} Z_{i=high} + \alpha_2 W_{it} Z_{i=high} + \varepsilon_{it} \quad (6)$$

Where I_{it} is an indicator variable of whether the observation of the individual occurred during the period in which Stakeholder Pensions were available, Z is the earnings band of the individual, $\gamma_2 W$ is a polynomial (cubic) on the actual earnings of the individual and other variables are as before. This model tests two possibilities. First, the significance (or otherwise) of the vector of coefficients $[\gamma_1, \gamma_2]$ tell us whether or not the characteristics of those observed among the pooled groups before the reform occurred are different to the characteristics of those observed after the reform was implemented. Second, the (lack of) significance of the vector of coefficients $[\theta, \alpha_1, \alpha_2]$ tell us whether or not any changes in characteristics over time occurs differently between those in the control group (the higher earnings group) and those in the treatment group (i.e. the middle earning group, the lower earnings group and the zero earnings group respectively). It is this second test which is important for our analysis – the common trends assumption will be less likely to hold if changes in the characteristics of those observed in the control and treatment group are occurring differentially by the relevant treatment and control groups.¹⁵

This model is run first using data from those in the higher earning group and those in the middle earning group, then for those in the higher earning group and those in the lower earnings group and then finally for those in the higher earnings group and those in the zero earnings group (where we do not test for differences in earnings). In all three of these models the results show that our sample is, on average, slightly older and slightly better educated in the period after stakeholder pensions were implemented. This

¹⁵ Note that this is a more stringent test of the ‘common trends’ assumption than is required, since the common trends assumption could still be valid even if characteristics changed differentially over time across the control and treatment groups, but these specific characteristics did not affect the take-up of private pensions, or if differential changes in characteristics just happened to cancel out in their *net* impact on average take-up among the control and treatment groups.

is not surprising given that over time the UK population is ageing and that successive cohorts are achieving more education qualifications.

There is little evidence of a differential change in characteristics between those in the higher earning group and the middle earning group or between those in the higher earning group and those in the lower earning group. In both cases the coefficients on the interaction terms are not jointly different from zero at conventional levels of statistical significance ($\chi^2(15) = 17.71$, $\text{Prob}>\chi^2 = 0.28$ and $\chi^2(14) = 20.94$, $\text{Prob}>\chi^2 = 0.10$ respectively). Looking at the individual interactive coefficients the majority – specifically those relating to age, education, partners earnings and own earnings – are also not different from zero at conventional levels of statistical significance.¹⁶ This is reassuring given that these are the main groups that this paper focuses on. The results from examining whether or not there are differential changes in characteristics of those in the higher earning group compared to those in the zero earning group are somewhat different - the coefficients on the interactive terms are jointly different from zero ($\chi^2(13) = 27.97$, $\text{Prob}>\chi^2 = 0.01$). In terms of the coefficients on the individual interactive terms we find evidence that men, single individuals and those with higher levels of qualifications are less likely to be observed after the reform in the higher earning group relative to those in the zero earnings group.¹⁷ This makes it less likely that the common trends assumption will hold in the case of the analysis of those in the zero earnings group. Together, we interpret these results as confirming the robustness of our conclusions concerning the lack of impact of the pension reform on our middle earner group, the positive effect on take-up among the low earner group, and reinforcing that the result for zero earners is less robust.

5. Conclusions

Our starting point was the policy debate concerning the best ways of encouraging people to save for their retirement. Stakeholder Pensions, introduced in 2001, were targeted by the government on middle earners as a means of filling a perceived gap in retirement saving products. The introduction of Stakeholder Pensions was also associated with a change in the contribution limits which, essentially, allowed lower

¹⁶ For the middle earning group we find that men are less likely to be observed after the stakeholder pension reform in the higher earning group relative to the middle earning group. For the lower earning group we find that men and single individuals are less likely to be observed after the stakeholder pension reform in the higher earning group relative to the lower earning group.

¹⁷ There is no evidence differential trend in terms of either age or partners earnings.

income earners to increase their contributions to retirement saving schemes. Our analysis represents the first systematic attempt, to our knowledge, to examine the impact of these recent policy developments on the probability of households engaging in retirement saving.

Aggregate data suggest that the introduction of Stakeholder Pensions had little impact on the overall propensity to save for retirement. However, exploiting a difference-of-differences estimator which allows for the discrete nature of the saving decision, we show that these aggregate trends conceal a more complex picture. Our results show that there was a downward trend in saving for retirement in 2001 and 2002 that was partially counteracted by the introduction of Stakeholder Pensions. In contrast to the Green Paper, the impact of the innovation seems to have been greatest on low earning individuals (earning less than £9,000 annually), especially those with higher earning partners. We interpret these results as suggesting that the change in the contribution limits associated with the reform, rather than the targeting of specific groups, had the real impact. We confirm this by an additional simple test that identifies the group who were affected by the change in contribution limits.

What does this imply for policy? First, there is the continued downward trend in the probability of saving for retirement in the early 2000s that the introduction of Stakeholder Pensions has offset but not reversed. Second, the results confirm that individuals respond to tax incentives in making retirement saving decisions - a result incidentally confirming much of the US literature on the impact of contribution limits on saving in Individual Retirement Accounts (see again *Journal of Economic Perspectives*, 1996, and the literature cited therein). Third, an important policy impact on couples where one member earns most of the income is that the household may end up with a more equitable distribution of pension rights as a result of the reform considered here. Finally, the results suggest that it is important to know the details of a given policy reform, rather than just the 'headline' target, in order to understand how the policy might work in practice.

6. References

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