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The Effect of Personal Allowance Withdrawal on Personal Pension Contributions

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ABSTRACT

This paper analyses the effect on contributions to personal pensions of the UK's decision to phase out the personal allowance for taxpayers with incomes over £100,000 per year. This policy took effect from the tax year 2010/11 and resulted in an increase in the effective marginal income tax rate from 40% to 60% for taxpayers whose personal allowances were being phased out. The analysis shows that, while personal pension contributions increased, the price elasticities of demand for pensions by the affected groups were approximately 0.33 for employees and 0.52 for the self-employed. The fact that these were less than one implies that the effected groups were reducing their net expenditure on pension contributions, perhaps in response to the reduction in their after-tax income produced by the policy.

Keywords: Personal pension contributions, tax allowance withdrawal, elasticity of taxable income

JEL Codes: H24, D14

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1. Introduction

The purpose of this paper is to analyse the extent to which the UK's decision to phase out the personal allowance for taxpayers with incomes over £100,000 per year affected the personal pension contributions of the affected taxpayers. This decision came into effect in the tax year 2010/11 and resulted in an increase of the effective marginal tax rate for taxpayers whose personal allowances were being phased out. This increased the incentive for taxpayers in this income range to contribute to a pension because such contributions are deductible in the calculation of their income for the purposes of the phase out, but also reduced their after-tax incomes.

This issue is of interest to tax policy makers because of the role that pensions play in providing income to people in retirement and because higher pension contributions (up to certain limits) would reduce taxable income and so offset part of the tax revenue increase that would arise from the phasing out of the personal allowance.

As pension contributions are deductible (within limits) from taxable income, the academic literature relevant to this issue is that relating to the 'elasticity of taxable income', a measure of the responsiveness of the size of the tax base to changes in the marginal tax rate.¹ This literature is comprehensively surveyed by Saez, Slemrod and Giertz (2012).

The data used in this research come from Self-Assessment tax returns, accessed in the HMRC Datalab², in which taxpayers report their contributions to personal pensions. However, there is no equivalent reporting of contributions to occupational pensions, because these contributions are deducted at source by the employer and only the pay net of these contributions is reported on the tax return. This is the reason why this paper is only able to analyse the effect of the tax change on personal pensions.

This limits the usefulness of the study by excluding a large number of people who contribute only to occupational pensions, but it should be noted that the personal income tax treatment of pension contributions is the same for personal and occupational pensions. Occupational pensions also have a National Insurance Contribution advantage that is not available to personal pensions: the employer's pension contributions are not subject to either employer or employee National Insurance Contributions. Nonetheless, the change in the incentive from the withdrawal of the personal allowance is similar in the two cases as the National Insurance rules were not altered.

¹ This elasticity measures the responsiveness of taxable income to changes in the marginal tax rate. It is defined as the proportional change in taxable income divided by the proportional change in the fraction of marginal income that is left in the hands of the taxpayer ($1 - \text{the marginal tax rate}$).

² HM Revenue & Customs (HMRC) agrees that the figures and descriptions of results in the attached document may be published. This does not imply HMRC's acceptance of the validity of the methods used to obtain these figures, or of any analysis of the results. Please note that all statistical results remain Crown Copyright, and should be acknowledged either as such and/or as "Source: Calculations based on HMRC administrative datasets". Copyright of the statistical results may not be assigned. Written work intended for publication should include a note to the effect that: "This work contains statistical data from HMRC which is Crown Copyright. The research datasets used may not exactly reproduce HMRC aggregates. The use of HMRC statistical data in this work does not imply the endorsement of HMRC in relation to the interpretation or analysis of the information."

The remainder of the paper is arranged as follows. Section 2 describes the tax changes that were introduced for the tax year 2010/11. Section 3 outlines the economic theory of how taxpayers might respond to these changes. Section 4 describes the empirical approach and section 5 discusses the empirical results. Finally, Section 6 draws some conclusions.

2. The main personal income tax changes in 2010/11

The tax change that this paper is focussed on was introduced in the 2010/11 tax year and consisted of a gradual withdrawal of the value of the personal allowance (a tax-free amount of income, equal to £6,475 in 2009/10, available to all taxpayers) when a taxpayer's 'Adjusted Net Income' for a year exceeded £100,000. For these taxpayers, their personal allowance was withdrawn at a rate of 50p for every pound of Adjusted Net Income above £100,000, and disappeared at $£100,000 + 2 \times (\text{personal allowance})$. So, in 2010/11, when the personal allowance was still £6,475, its withdrawal was complete when the taxpayer's Adjusted Net Income equalled £112,950.

It is important to note that the definition of income used in determining the withdrawal is Adjusted Net Income. This consists of:

- Total income minus trading losses
- Minus charitable contributions
- Minus pension contributions

This is clearly different from the concept of total income. It is also different from the concept of taxable income, which takes account of all reliefs (notably including the personal allowance).

Within the income range of the personal allowance withdrawal, the effective marginal tax was increased by this change from 40% (the statutory tax rate that applied over this range) to 60%. This was because each extra pound resulted in a 50p reduction in the personal allowance, which meant that 50p more income was subject to the 40% tax rate. So, the overall marginal tax rate became 40% (for each extra pound) plus $0.5 \times 40\%$ (for the reduced personal allowance) = 60%.

Because pension contributions are deducted from total income in arriving at Adjusted Net Income, this increase in the effective marginal tax rate increased the effective value of the pension tax relief for people in the withdrawal range (from 40% of the contribution to 60%). The purpose of this paper is to investigate the effects of this increased effective value on taxpayers' pension contributions.

There were also two other significant personal income tax changes in 2010/11, both of which are also relevant to the incentives to make pension contributions.

The more well-known change was the introduction of a new 50% top rate of tax on incomes above £150,000. This change is not analysed in this paper but, like the withdrawal of the personal tax allowance, increased the effective value of pension tax relief.

The other change was the introduction of a limit on the annual amount of pension contributions that could benefit from pension tax relief. This annual limit was initially set at £255,000 but was reduced to £50,000 2011/12. This clearly reduced the incentive for additional pension contributions that applied to taxpayers who were contributing these amounts or more each year. This is taken into account, as far as possible, in the empirical work presented in this paper.

3. The theory

The economic theory that lies behind the analysis in this paper is fairly simple, identifying the changes in disposable income that apply to taxpayers within the income range of the withdrawal of the personal allowance. For the sake of simplicity, the analysis in this section assumes that the making of pension contributions is the only tax-preferred activity of these taxpayers. The model can readily be extended to include several different tax preferred activities, and there would be no change to the fundamental logic presented here.

It is convenient to think of the taxpayer spending their income in three different ways: consumption (C), non-pension savings (NPS) and pension contributions (P). Note that non-pension savings could be zero or negative. Income is denoted by Y and total taxes by T.

Before the personal allowance withdrawal was introduced, a higher rate (40%) taxpayer would face the following budget constraint:

$$C + NPS + P = Y - T = Y - 0.4x(Y - P) + LRA \quad (1)$$

where: LRA stands for 'lower rate adjustment': the value of the fact that income below the start of the higher rate band is taxed at a lower rate than 40%.

It is convenient to rearrange equation (1) as follows:

$$C + NPS = Y - P - 0.4x(Y - P) + LRA = 0.6x(Y - P) + LRA \quad (2)$$

Equation (2) illustrates two points. The first is that pension contributions are deducted from income before the tax rate is applied. The second is that an increase in pension contributions only reduces the amount available to spend on consumption and ordinary savings by 60% of the contribution, so that pension contributions have a tax advantage.

The introduction of the withdrawal of the personal allowance modifies equation (2) in the following way:

$$C + NPS = 0.6x(Y - P) + LRA - 0.4x0.5x(Y - P - 100,000) \quad (3)$$

The new expression on the right-hand side of equation (3) represents the additional tax payable by a taxpayer in the withdrawal range: the 40% tax rate is applied to half of the extent to which Adjusted Net Income (Y-P) exceeds £100,000. Expressed in this way, equation (3) illustrates the (obvious) point that the withdrawal of the personal income tax reduces the amount that the taxpayer has available to spend.

However, equation (3) can be re-arranged to bring out the other aspect of the withdrawal of the personal allowance:

$$C + NPS = 0.4x(Y - P) + LRA + 20,000 \quad (4)$$

Equation (4) makes it clear that the withdrawal of the personal allowance reduces the cost of pension contributions, so that the reduction in other expenditure that results from an increase in pension contributions is only 40% of the additional contribution. This means that the tax change has produced

a negative 'income effect', by increasing the tax payable, and a positive 'substitution effect' (measured by the elasticity of taxable income) by making pension contributions cheaper. We would expect that the income effect would reduce pension contributions and that the substitution effect would increase them. The overall effect of the tax change on pensions is, therefore, ambiguous. It will be one of the roles of the empirical work to discover which effect predominates.

Before moving to the empirical analysis, it is interesting to consider what would have happened if pension contributions had not been allowed as a deduction in the definition of Adjusted Net Income. In that case, equation (3) would have been replaced by:

$$C + NPS = 0.6x(Y - P) + LRA - 0.4x0.5x(Y - 100,000) \quad (5)$$

Comparison of equation (5) with equation (3) shows that the reduction in disposable income would have been greater than it now is, for people contributing to pensions.

A rearrangement of equation (5) to produce the equivalent of equation (4) results in:

$$C + NPS = 0.4xY - 0.6xP + LRA + 20,000 \quad (6)$$

Equation (6) shows that the exclusion of pension contributions from the calculation of Adjusted Net Income would not have had a substitution effect on pension contributions, as the coefficient of P is unchanged. The only effect on pensions would be the income effect, leading to the expectation that pension contributions would have been reduced.

4. The Methodology

This section describes the various aspects of the statistical methodology that is used to measure the effect of the tax change on the pension contributions made by those taxpayers with incomes in the range of withdrawal of the personal allowance.

4.1 The data

The data used in this study are held in the HMRC Datalab and come from the Self-Assessment tax returns that have to be completed by people who have sufficiently complex tax affairs, including people who have made personal pension contributions.

The data include considerable information on the taxpayers' finances (apart from contributions to occupational pensions) but little non-financial data that could be used to pick up preference parameters. However, it was possible to merge in data on the age of each taxpayer

4.2 The statistical approach

The statistical approach used in this paper to estimate the effect of the tax change is known as 'diff-in-diff', a short-hand term for a difference in a difference, to compare the changes to pension contributions of those subject to the tax change with those of people with income that is not subject to it, because their income is somewhat below the threshold. This is generally accepted as being a better approach than simply measuring the changes in pension contributions of those subject to the change,

as it controls for other changes in the economy that can be expected to affect the pension contributions of both those affected by the tax change and those with income slightly below the £100,000 threshold.

A similar diff-in-diff estimation was conducted by Direr and Ennajar-Sayadi (2016), in their analysis of the impact of changes in the French retirement savings rules that changed the relative cost of annuities for women and single men. However, there is an important difference: the genders of the people in the French study are exogenous and fixed. In contrast, the adjusted net incomes of the people in this study are not fixed and may be affected by the marginal tax rate, and other factors. This raises the possibility that taxpayers may change their pension contributions in a way that causes them to cross the £100,000 threshold in either direction, causing their marginal tax rate to change. In such a case, it is a pension change that is causing the marginal tax rate to change, rather than the reverse. In other words, both the marginal tax rate and the pension contributions are endogenous variables.

In order to identify the causal relationship from the tax rate to the pension contributions, the adjusted net income of each taxpayer in 2009/10 is used as an instrument for whether or not that taxpayer will have an adjusted net income at or above the threshold of £100,000 in the years after the tax change. This use of an instrumental variable also ensures that the estimates of the effect of the tax change on pension contributions is estimated consistently. This approach is similar to that used by Gruber and Saez (2002) in their estimation of the elasticity of taxable income in the United States.

In order to include both taxpayers affected by the tax change and those who were not, this study used data from people with adjusted net income between £80,000 and £110,000 in 2009/10 (the year before the change was introduced). £110,000 is somewhat below the top of the range over which the personal allowance was withdrawn (£112,950 in 2010/11) to avoid the results being affected by people anticipating that their income might fall above the range.

The validity of diff-in-diff estimates depends on the ‘parallel trends assumption’, that the responses to economic changes of the two groups (those below the threshold and those above it) are similar over time. This is the reason why a fairly narrow range of incomes either side of the threshold was chosen, to minimise the possible differences in behaviour. In addition, the estimation technique controls for individual ‘fixed effects’: characteristics of individuals (such as age at a particular date, sex and attitudes to risk) that could affect pension decisions but remain constant over the period. This automatically corrects for any differences in the composition of the two groups in terms of age, gender, education etc.

Despite controlling for personal characteristics, people with incomes above the £100,000 threshold are more likely to experience a reduction in income than those with incomes below the threshold, because of mean reversion. However, this problem is avoided by the use of the instrumental variable estimation, which effectively replaces the actual income of each taxpayer in each year by the fitted value from an equation that includes their adjusted net income in 2009/10 (before the policy change). This equation will capture any observed mean reversion in the fitted values, and so produce a consistent estimate of whether each taxpayer will be above or below the threshold after the policy was implemented.

The study used data for these people for the two tax years before the change and two years afterwards, in order to reduce the impact of random variations. However, it should be noted that not all of the people who filed tax returns in 2009/10 filed returns in each of the other three years (although the

average number of years that the 32, 627 sample employees were present in the sample was 3.8, while for the 7,566 sample of self-employed the corresponding number was 3.9). This meant that the panel of data was ‘unbalanced’, but this does not invalidate the statistical reliability of the results.

4.3 *The sample*

The study only includes people who had made a strictly positive personal pension contribution of less than £50,000 in the year before the change was made. The exclusion of people who were not making a private pension contribution in 2009-10 was to eliminate people who appeared not to be interested in private pensions, perhaps because they had an occupational pension scheme. However, it does mean that the study does not identify people who started contributing to a private pension as a result of the tax change. The exclusion of people making private pension contributions of more than £50,000 in 2009/10 was designed to eliminate people whose pension contributions might be affected by the annual contribution limit tax relief of £50,000 that was introduced in April 2011. However, as some of the people in the sample might have also been making contributions to an occupational pension scheme, it is still possible that some people with total contributions above the limit are included in the sample.³ This could bias the reported results to some extent.

The study looked at two groups:

- The **self-employed**, who have been defined for this study as people who receive at least half their income from self-employment.
- **Employees**, who have been defined for this study as people who receive at least half their income from employment.

The determination of the group into which each taxpayer falls is based on their status in 2009/10. Because the self-employed do not have access to occupational pension schemes, the coverage of the self-employed is expected to be higher than that of employees.

4.4 *The variables*

The variables of interest in this study are those involving the dummy variable (Treatment) that takes the value 1 in 2010/11 and 2011/12 if the taxpayer’s adjusted net income in these years was predicted to be at least £100,000 by the instrumental variable estimation discussed in section 4.2. Otherwise it takes the value zero.

In order to allow for the possibility that the response to the treatment depends on age, two interaction specifications were also used (depending on the precise specification of the equations):

- The treatment dummy multiplied by the person’s age in 2009/10, to capture the possibility that the response is age-related.
- The treatment dummy multiplied by the person’s age in 2009/10 squared, to capture the possibility that the age-related response is non-linear.

³ The rules associated with the contribution limit were actually more complicated than a simple £50,000 limit. In fact, taxpayers were able to carry forward up to three years of unused allowances. This would have enabled some to be unaffected by the limit for a period after it was introduced.

Note that it is not necessary to have a simple age or age squared variable, as is usual when interaction terms are included. This is because the effects of both age and age squared are captured by the individual fixed effects.

The other variables, introduced to control for other factors that might influence the level of a person's pension contributions, are:

- A dummy variable for each of the tax years apart from the first, to capture any changes between the years that affect the pension contributions of both people affected by the tax change and those who are not affected.
- An individual fixed effect, which effectively allocates a separate dummy variable to each taxpayer. This controls for any individual characteristics, such as age in 2010-11 or attitude to pensions, which do not alter over time.

5. Results

The initial estimation results are presented in Table 1, which focusses on the effects of the policy change and does not report the values of the constant term and the coefficients on the dummy variables for each year. The results are reported separately for Employees and the Self-employed and, in each case are shown for three specifications: the first has no age effect, the second includes an interaction term between age and treatment (to determine whether the effect of the policy change differs by age) and the third adds in an interaction term between the treatment and the square of the age (to detect any non-linear effect of age).

TABLE 1: Effects of Treatment and Age

| Variable | Employees | | | Self-employed | | |
|----------------------------|----------------|------------------|---------------------|----------------|--------------------|----------------------|
| Treatment | 717** (337) | 4245*** (862) | -17112*** (2366) | 1573 (1264) | 15967*** (2809) | -31617*** (10901) |
| Treatment*Age | | -75*** (19) | 868*** (178) | | -296*** (54) | 1783*** (464) |
| Treatment*Age ² | | | -10.10*** (1.93) | | | -21.90*** (4.85) |

Note: Numbers in parentheses are standard errors. Significance levels are shown as follows:

*** <1%, **<5%, *<10%.

The first specification shows a statistically significant effect of the policy change for employees of £717, representing an 11% increase over the approximately six and a half thousand-pound average pension contribution of the employed taxpayers in the dataset. As the policy change reduced the cost of a marginal pension contribution by one-third (from 60% to 40% of the nominal cost), this corresponds to a price elasticity of demand for pensions of about 0.33.

Turning to the self-employed, the estimated increase in pension contributions in the first specification is £1573, representing 17.5% of the corresponding average contribution in the dataset, which is about nine thousand pounds. This corresponds to a price elasticity of demand for pensions from the self-

employed of about 0.52. However, in this case, the coefficient in the first equation is not even significant at the 10% level. This may well be because the number of self-employed taxpayers in the sample (7,566) is substantially less than the number of employed taxpayers (32,647) but it could also be because the self-employed are a more heterogeneous group of workers than employees, especially in terms of the consistency of their annual earnings and thus their ability to finance a pension.

For both groups, the second specification shows that age has a significant effect on the changes to pension contributions: the coefficient on the interaction term is highly significant and the coefficient on the basic treatment term is more significant than before, reflecting the fact that the equation fits the data better. Finally, the third specification shows that the effect of age is non-linear, with all three coefficients being significant at the 1% level.

However, the estimated non-linearity in the age effect is driven by the unexpected substantially negative effect of the policy change on the small (less than 1%) proportion of the sample that were aged 25 years or less in 2009-10. It is clearly very unusual for people aged 25 or less to have an adjusted net income of more than £100,000, and so the estimates of the behaviour of this small group (whose detailed circumstances are not known) should not be allowed to influence the main conclusions of this study. In addition, there is a substantially smaller negative effect of the policy change on people between 60 and 65, especially those who are self-employed, which makes some contribution to the estimated non-linearity. This negative effect could be due to retirement of some of these people, who may have stopped making pension contributions but are still in the sample.

In these circumstances, it is more reasonable to regard the second specification, with a negative linear age effect, as the preferred specification. It more accurately describes the effects of the policy change on those affected by the policy change who were aged between 25 and 60. It is not clear why there should be this negative effect, but it could reflect less responsiveness of older workers to changes in incentives.

6. *Conclusions*

This paper has shown that the withdrawal of the personal allowance has increased the average level of personal pension contributions for those affected by the policy change. The implied price elasticities of the demand for pensions are approximately 0.33 for employees and 0.52 for the self-employed. The fact that these elasticities are less than one implies that the people affected by the policy change have reduced their expenditure on pensions, perhaps in response to the reduction in their after-tax income produced by the policy.

As, on average for this sample, pension contributions are below 10% of income, this suggests that these pension changes would only contribute less than 0.033 to the elasticity of taxable income for employees and less than 0.052 for the self-employed. This is very small compared to the estimated value of the elasticity of taxable income for high income earners of 0.46 that was used by Brewer, Saez, and Shephard (2010) in the Mirrlees Review to estimate the optimal top rate of income tax in the UK.

This result is rather surprising because increasing pension contributions is a very simple way of reducing a person's tax liability and the average level of private pension contributions in the sample is not on a scale that would provide a good pension in retirement, suggesting that shifting income into retirement is a good idea. Part of the explanation may be that this is not an income group that has historically thought much about tax planning, while another part may be simple inertia.

Finally, it is important to recognise the limitations of this study:

- i. The study is limited to those contributing to personal pensions and so is likely to exclude a large number of people who contribute to occupational pensions, unless they also contribute to a private pension. As explained in the introduction, this is an unavoidable result of the fact that information on payments to occupational pensions is not included in the tax returns. Care should, therefore, be taken in extrapolating the results of this study to all taxpayers subject to the taper of the personal allowance, despite the fact that the change in the incentives for pension contributions are similar.
- ii. Some of the taxpayers in the sample used in the study may have occupational pensions in addition to their private pensions. As we are unable to observe any changes in their contributions to their occupational pension scheme, with the data available, the omission of these changes may bias the results. In particular, taxpayers who also contribute to occupational pensions could have been affected by the limit on annual pension contributions, despite the fact their personal pension contributions were below that limit. This problem is unavoidable because of the nature of the data available from tax returns.
- iii. The inertia that may be accounting for some of the limited response to the increased incentive for pension contributions is likely to decrease over time as taxpayers subject to the taper become aware of the increased advantages of making additional pension contributions. So, the response to the taper can be expected to increase to some extent. This issue could be studied when more years of data become available.
- iv. The study does not analyse the impact of this policy change on the decision of people without a personal pension to start contributing to one.

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