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Household Saving Rates and the Design of Public Pension Programmes: Cross Country Evidence

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Abstract

I argue that the offsetting effect of public pension contributions on household retirement saving depends on how closely the public pension programme imitates a private retirement saving plan (i.e. the 'actuarial' content of the public pension programme) – the closer the design of the programme to a private retirement saving plan, the higher the offset. I estimate the determinants of household saving rates in a cross-country panel, augmenting standard measures of public pension programme generosity and cost by indicators that proxy the actuarial component of the programme. These indicators affect saving rates as predicted.

Key words: pension reform household saving

JEL classification: E21 G23 H24

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1. Introduction

Standard life cycle theory and a large empirical literature argue that public pension programmes, which provide benefits after a certain age financed out of general or hypothecated taxes, affect household behaviour. First, public provision of retirement income affects the propensity of households to engage in private retirement saving and also their wealth decumulation strategy later in life. Second, by driving a wedge between the pre- and post-tax wage, publicly-provided pensions affect the gains from work and therefore the optimal length and intensity of the working life. Although studies differ in what they are testing and how they test it, there seems to be general agreement that public pension programmes affect household behaviour in direct proportion to the average level of pension contributions (being a large component of the tax 'wedge'), in proportion to the generosity of the public pension programme (the average 'replacement rate') and in relation to any specific disincentives to work and save late in life (e.g. retirement tests, means-testing of retirement incomes, and the like).

The literature pays rather less attention to how the *design* of public pension programmes affects these dimensions of household economic activity. Public pension programmes vary substantially in their provisions – not just in average generosity but also in, for example, how closely individual public pension entitlements are related to individual contributions, in generational differences in the implicit 'rate of return' on contributions relative to rates of return available in the capital market, and so on. The implications of programme heterogeneity for household behaviour have not always been thought through in the existing literature, and variations across countries and over time have certainly not been exploited (to my knowledge) to test the underlying theory. This is the purpose of the present paper.

To illustrate programme heterogeneity: some recent public pension reforms (notably in Germany, Italy and Sweden) have been designed explicitly to make the public pension programme 'fairer' in some actuarial sense (i.e. so that individual benefits are more closely matched to individual contributions). There is an implicit assumption that this will 'improve incentives' and thereby affect household behaviour. In effect, making a tax-financed programme appear to be like a private retirement saving plan may cause individuals to interpret public pension contributions less as a tax and more as a mandatory saving contribution so that the 'tax wedge' impact on employment is reduced. However this occurs at the expense of making public pensions a closer substitute for private retirement saving and thereby potentially reducing private retirement saving.

In contrast, greater targeting of public pension benefits on poorer pensioners (as has happened in, for example, the United Kingdom since the mid-1990s) will certainly increase the disincentives both to save and to work later in life for prospective recipient households but, by making the programme look less like an actuarial programme, have quite different effects on other, better-off, groups in the population. The net effect on incentives to save and work later in life may go in either direction depending on the exact design features of the programme, preferences, rates of return and so on.

Since the key policy trade-off is whether to make the public programme more like a tax system (as in the UK, say) or more like a surrogate retirement saving system (as in Sweden, say), the optimal direction of pension reform therefore depends on the trade-off of potential welfare losses arising from reduced retirement saving (such as a lower capital stock) against potential losses arising from lower employment (loss of current output). If retirement saving is more sensitive to programme design than employment and participation levels (since labour supply responses to changes in *average* tax rates are probably low – see Disney, 2000a), the former loss may be larger than the latter. But the sensitivity of private saving rates to programme design is an empirical issue, and is investigated here.

This paper therefore examines how actual variation in the design of public pension programmes across countries and time affects one dimensions of economic activity of households: household saving. In a previous paper (Disney, 2004), I focussed on the impact on employment rates. In the absence of any large volume of literature on this topic (see Section 3 for a discussion), there are two broad ways of tackling this issue. First, we can match exact prospective benefit entitlements to individual households and investigate whether differences in current or subsequent household behaviour (for example, the current saving rate, prospective retirement date etc.) correlate with these projected benefit entitlements. Although this approach is feasible for a few countries, there are insufficient data sets of this type to undertake a cross-country analysis. In any event, this approach begs the question of whether people understand the programme in sufficient detail to be able to make projections of their own benefits (or benefit-cost ratios) based on current criteria (and indeed, on forecasts of future government policy).[1] In addition, snapshots of household behaviour cannot exploit variation in pension regimes across time or country to examine behavioural responses.

The second broad approach, which is adopted here, is to assume that households understand the *general* provisions of the programmes to which they contribute. They broadly understand, for example, whether programme benefits and contributions are earnings-related ('Bismarck') or are designed to provide a basic income floor ('Beveridge'). Moreover, households understand what, in general terms, they pay into the programme relative to what they expect to get out of it. Using a representative-household approach, we can then exploit cross-country and cross-time period variation in the average characteristics of programmes in order to examine differences in aggregate saving rates. The paper shows that the design of the programme, in the twin senses of variations in within-cohort and across-cohort 'returns' on contributions, does indeed affect household saving rates. As such, the study extends in a new direction the existing work (from OECD and others) that simply focuses on the effect on macroeconomic aggregates of the average generosity and budgetary costs of public pension programmes.

The next section of the paper briefly examines the design of public pension programmes in a standard framework. It then suggests how design differences might be expected to affect various dimensions of household behaviour, *a priori*. It also surveys the existing empirical literature (most of which ignores programme design issues completely). Section 3 then provides a brief account of the construction of the key variables. Section 4 contains econometric evidence that shows quite clearly that public pension programme design matters; moreover, careful specification of these design features appears to obtain greater precision in the estimate of the average effect of public pension – notably of the degree of 'saving offset' arising from the public pension programme. Section 5 then summarises the main conclusions of the paper.

2. Theory and existing literature

2.1. *Some basic analytics*

[1] See Dominitz, Manski and Heinz (2003) for an explicit attempt to model household pension expectations in the United States and, for a more general discussion of pension expectations in several countries, Boeri, Börsch-Supan and Tabellini (2001).

This sub-section illustrates the main arguments with a minimum of formality. using a simple two period OLG model. I broadly follow the notation of Lindbeck and Persson (2003). *Generations* are denoted by *t, t+1* and periods of the life are denoted i=1,2. The individual consumer/household works in period 1 and is retired in period 2, with known date of mortality and no bequests.

Suppose there is a public pension programme paying benefit *b* in the second period and financed by a payroll tax proportional income tax in period 1 levied at rate τ. Second period consumption can then be written as:

$$c_t^2 = [y_t^1(1-\tau) - c_t^1](1+r) + b \tag{1}$$

where *c* is consumption and *r* is the rate of interest, and *y* is labour income where *y=w l*; *w* is the wage rate and *l* is some measure of lifetime labour supply. If individuals cannot borrow in period 1 against future public pension income, second period consumption is determined by first period saving, by the real rate of interest, and by the size of the public pension benefit.

Assume that the public pension programme is financed on a pay-as-you-go (PAYG) basis – that is, out of current taxation. Again following the standard notation, write:

$$n_t \hat{b}_t = \tau_{t+1} n_{t+1} \hat{w}_{t+1} \hat{l}_{t+1} \tag{2}$$

where hats over variables denote population averages and *n* denotes the size of the generation. This simply says that the total value of benefits paid is equal to the payroll tax rate times the total wage bill. The average 'return' on contributions for a member of generation *t* can be written as:

$$\hat{b}_t / \tau_t \hat{w}_t \hat{l}_t = (1+G) \tag{3}$$

This states that the internal rate of return on contributions, G, depends on the average stream of benefits relative to the average total value of contributions paid by a member of that generation. Substituting for *b* in (2), denoting n_{t+1}/n_t as (1+*n*) and $\hat{w}_{t+1}/\hat{w}_t$ as (1+*g*), write:

$$\frac{\tau_{t+1}\hat{l}_{t+1}}{\tau_t \hat{l}_t}(1+n)(1+g) = (1+G) \tag{4}$$

With a constant tax rate and a constant labour force participation rate, we get the standard Aaron-Samuelson result that the sustainable long run 'return' on public pension contributions, *G**, is approximately equal to the growth of population and the growth of real wages. With dynamic efficiency, this rate should normally be less than *r*, and this discrepancy is sometimes called the 'implicit tax' associated with PAYG finance of public pension. However, if governments can increase the participation rate of contributors within the public pension programme, or else levy ever-increasing tax rates, G will temporarily exceed G* for a period of time and for particular generations (this is especially likely for the earliest generations in a newly-instituted programme).

To illustrate how the design of the public pension programme matters, I continue to assume that the payroll tax, τ, is proportional to the wage, so specific design features are illustrated through the specification of the public pension benefit, *b*. Assume, therefore, that the public pension benefit is part-'Beveridge' and part-'Bismarck' along the lines described by Casamatta, Cremer and Pestieau (2000), as in (5):

$$\hat{b}_t = \alpha(1+G)\tau y_t + (1-\alpha)\overline{b} \qquad (5)$$

Here, the average benefit paid is composed of two components. The first component, weighted by α, is the fraction of the benefit that is proportional to earnings and earns the average 'return' on contributions *G*. This is the 'Bismarck' component of the programme. The second component, weighted by $(1-\alpha)$, pays a flat benefit $\overline{b}$ (or some other formula) entirely unrelated to individuals' contributions to the programme. This is the 'Beveridge' component of the programme.

Substituting (5) into second period consumption in (1), we get:

$$c_t^2 = y_t^1[1 - \frac{(1+r-\alpha(1+G))}{(1+r)}\tau - c_t^1](1+r) - (1-\alpha)\overline{b} \qquad (6)$$

To see what implications this programme design has for the average tax rate on the individual, we can consider several simplifications of this rather cumbersome formula. Suppose first that $r = G$ and $\alpha = 1$. This is the case where the public programme effectively imitates a private retirement saving programme – the last term and the term in τ drop out. So long as the mandatory retirement saving rate through the public programme does not exceed the saving that the individual would have undertaken himself or herself, the programme has no impact on individual labour force participation and there will be a one-to-one offset of private retirement saving.

A straightforward simplification also arises if we assume $r = G$ but that $0 < \alpha < 1$. The programme departs from *actuarial fairness* only insofar as part of the pension benefit paid by the programme is unrelated to individual contributions. The lack of actuarial fairness can be measured by differences in replacement rates across individuals within a generation i.e. a departure from an actuarial basis to the programme in an *intra*generational sense. (6) then simplifies to:

$$c_t^2 = y_t^1[1-(1-\alpha)\tau - c_t^1](1+r) - (1-\alpha)\bar{b} \qquad (6a)$$

Therefore, the greater the degree to which the system departs from actuarial fairness, as measured by $(1 - \alpha)$, the higher the 'tax component' of the public pension contribution, τ. The impact on the aggregate saving rate then depends on the effects on the saving of the 'gainers' relative to the 'losers'.

Conversely, suppose $r \neq G$ and $\alpha = 1$. I term this a departure from *intergenerational equity* insofar as average 'returns' to contributors differ across generations. (6) then becomes:

$$c_t^2 = y_t^1[1-\frac{(r-G)}{(1+r)}\tau - c_t^1](1+r) \qquad (6b)$$

The average tax component of the contribution is simply the difference between the return on saving and the 'return' on public pension contributions as defined by (3).

In practice, public pension programme contributions contain a 'tax component' arising from departures from both actuarial fairness *and* intergenerational equity, although the extent of these relative deviations depends on the design of the programme. It is measuring these departures from an actuarial programme, and measuring the impacts of these divergences on labour supply and saving behaviour, that form the empirical part of the paper.

2.2. *Impact of the public pension programme on household saving*

The argument that public pension contributions reduce household saving rates is straightforward. If contributions to a public pension programme are a perfect substitute for private retirement saving, public pension contributions should offset private saving one to one. However there are various well known *caveats* to this interpretation of public pension contributions. First, some private saving may not be for retirement (e.g. for buffer stock or precautionary motives) and so measured offset coefficients may be lower. Second, where mandatory saving (i.e. contributions to the public programme) exceeds that which the individual would have done in the absence of the public programme, lifetime consumption as well as saving may be affected. Third, there are various issues concerning the correct measurement and interpretation of private saving, especially when we consider the decumulation phase of funded private pensions and indeed public pension itself (e.g. Jappelli and Modigliani, 2003).

The preceding analysis suggests that the design of the public pension programme should have an impact on the extent of the saving offset. In the intergenerational comparison, the closer the programme is to a saving programme (i.e. where $R = g$), the greater the potential offset for private saving because of the substitutability between contributions to the public pension programme and a private retirement saving plan (leaving aside differences in the risk characteristics of the respective portfolios).

Where the public programme departs from an actuarial pension plan in an *intra*generational sense, the analysis of the potential offset effect is more complicated. If the public programme is highly redistributive within a generation towards lower earners, poorer households will have an incentive to save less, whereas higher earners do not receive a return on their contributions equivalent to a private retirement plan and their saving will be hardly affected. The offset should therefore be highest among low earners. But since, as a matter of fact, most private saving is done by high lifetime earners, the average measured offset should be lower the higher the degree of redistribution within the programme. The only qualification to this is if the programme differentially affects the retirement behaviour of high and low income earners – the 'induced retirement effect' noted by Feldstein (1974).

2.2.1. Empirical evidence on the saving offset from public pension programmes

There is a substantial empirical literature on how contributions to public pension programmes affect private saving rates.[2] Several studies calculate prospective public pension entitlements across households and examine whether these values are associated with differences in household saving rates (as in, for example, Kotlikoff, 1999, Hubbard, 1986, Alessie, Kapteyn, and Klijn, 1997). Results are sensitive to the calculation of expected pension wealth and the measures used to calculate prospective wealth (e.g.

2 For a selective survey, see Disney (2000b).

current and predicted earnings) are likely also to exert an independent effect on household saving; moreover, there has to be regime variation to examine differences in behaviour across alternative types of programmes. Some of the studies find weak relationships at best; indeed Kotlikoff argued that his results "…cast doubt on the ability of people to accurately project their public pension benefits and their age of retirement; large differences in lifetime wealth generated by the public pension system do not appear to influence savings" (*ibid.* p.408).

A few recent studies do explore the promising avenue of using pension regime changes in order to measure offsets of private retirement saving arising from public pension programmes using household data, notably Attanasio and Brugiavini (2003) and Bottazzi, Jappelli and Padula (2004) for Italy and Attanasio and Rohwedder (2003) for the UK, but such studies are relatively unusual and generally limited to one 'reform'.

Most studies of the 'offset' between public pension programmes and private saving therefore use either time series methods, or country cross sections, or a combination thereof. The seminal paper by Feldstein (1974) estimated a time series model of consumption spending regressed on income, public pension wealth (SSW; both gross and net of contributions) and other household wealth for the US economy 1929-71. From it, he calculated that total private household saving was approximately halved by public pension wealth. This article spawned a good deal of controversy concerning methodology, data and estimation methods. A flaw in the programming was subsequently corrected (e.g. Feldstein, 1996) but Leimer and Lesnoy (1982) argued that the measure of the replacement ratio should take account of the cohort-by-cohort variation in expected RRs rather than simply assuming a constant RR as Feldstein did (bar the major change in benefit rules that occurred in 1972). With the revised specifications, they found no offset between SSW and saving.

In another paper, Feldstein (1987) calculates the trade-off for various parameter values between a means-tested public pension programme that encourages some households to stop retirement saving completely but which requires a lower contribution rate, and a comprehensive Bismarck-style earnings-related programme that requires a higher contribution rate and which encourages *all* participants to reduce their retirement saving by some fraction. In general, his simulations suggest that the net impact on household saving will be higher in a comprehensive public pension programme (that is where α and τ are higher, in the terminology of Section 2) than in programmes where benefits are specifically targeted, although of course in the latter case some households will not save at all in order to avoid the prospective impact of the means test in retirement.

Finally, we can note that several papers approach the issue of public pension programmes and retirement saving using cross-country data sets, with mixed results. Early studies such as Barro and MacDonald (1979) and Koskela and Viren (1983) found no evidence that more generous public pension programmes (proxied simply by public pension/GDP ratios with additional demographic controls) reduce household saving. In contrast, a short panel analysis of 12 OECD countries by Feldstein (1980) suggests that a '10% percentage increase in the benefit-to-earnings ratio reduces the saving rate by approximately 3 percentage points' (*ibid*, p.236). More recently, Callen and Thimann (1997) suggest that demographic dependency, the ratio of direct taxes to GDP and the ratio of gross transfers to GDP all have adverse effects on household saving in a long panel of 21 OECD countries, although public pension generosity is not included among the variables. Recent studies with greater samples of countries and greater econometric sophistication (e.g. Loayza *et al*, 2000) find evidence that private and household savings rates are affected by demographics but do not include any variables that reflect public pension wealth or other proxies. No studies, therefore, to the author's knowledge, utilise public pension programme design as a variable in cross-country estimates of the determinants of household saving.

3. Empirical estimates

3.1. *Data and methods: core variables*

The empirical analysis here is conducted for 21 OECD countries for which consistent data are available over a long period, in fact allowing the construction of a panel of three decades. The variable to be explained, the **household saving rate** as a percentage of GDP, is taken from IMF sources (primarily cited in Callen and Thimann, 1997), updated from the OECD database.

The analysis assumes that a 'representative agent' is considering future retirement in each country in three periods: the 1970s, 1980s and 1990s (I take mid-points of the decades) and define the variables in turn. The average public pension replacement rate (**Pension RR**) uses rates calculated by Blöndal and Scarpetta (1998). These rates are projected replacement rates for workers in their mid-50s, when they subsequently retire, for each period and country (the authors provide several replacement rates at each point in time, the variation in which is also exploited – see below).

I do not use actual reported contribution rates to public pension programmes, as these are often notional rates (including zero). Instead, I use data from the ILO (with some adjustments, described in the Appendix to the present paper) to construct ratios of workers to pensioners in each period (see Appendix Table A1; this is the variable **support ratio** in some tables below). Given the average replacement rates from Blöndal and Scarpetta, these support ratios can then be used to calculate 'effective' contribution rates using equation (2) above – these are the contribution rates that are effectively being levied to finance the current outgoings of the public pension programme given demographics and expected current replacement rates. These calculated values, described in Table A2, are the **contribution rate** used in the later empirical estimates. Note that estimates of internal rates of return to pension contributions (see below) require that this calculation of contribution rates be made for each decade from the 1950s to the 1990s.

Several variables are used to capture the design features of the public pension programme. The first, termed a **pension tax**, is designed to measure the deviations of rates of return *within* cohorts arising from variations in replacement rates across household types. It is intended to capture the term $(1-\alpha)$ in equation (5), and therefore to measure departures from what I termed *intra*generational 'actuarial fairness' in Section 2. To construct the variable, I calculate the coefficient of variation of replacement rates across several household types in the same country and year (delineated by level of income and number of people in the household) using the data contained in Blöndal and Scarpetta (1998) for several household types. If every household type receives the same replacement rate, the value is zero; the highest value is for Australia in 1995, where the coefficient of variation is almost 0.4.[3] This coefficient of variation, multiplied by the average contribution rate, gives the variable **pension tax** used in the statistical analysis.

The second variable is intended to capture differences in *inter*generational rates of return over time and country to public pension contributions, and involves rather more computation. It is termed **IRR at 65** in the ensuing tables, and involves estimating, for a representative agent in each country and period, the expected internal rate of return from

[3] Other higher values of this 'pension tax' include New Zealand, the UK and Ireland, all of which have 'Beveridge'-type pension regimes. See Disney (2004) for graphical illustrations.

retiring at age 65, akin to the *G* in equation (3) above. The method of constructing these internal rates of returns is described in the Appendix and in Disney (2004). It utilises the average replacement rates constructed by Blöndal and Scarpetta (1998) to generate expected pension replacement rates for three cohorts born in 1920, 1930 and 1940 and, therefore, broadly retiring in the mid 1980s, 1990s and 2000s. Given the calculated contribution rates over time, in each decade the contribution rate is applied to average earnings over the contributor's working life, which grow in each decade in real terms (the earnings index is obtained from OECD data). This gives the total value of contributions paid. The replacement rate is then applied to real earnings at retirement, and the pension is increased in line with subsequent earnings growth if earnings indexation is in place or price indexation otherwise. The method adjusts for differential normal retirement age and life expectancy across countries (although the benchmark estimates use a common retirement age of 65), as well as changes over time, and for survivors' benefits paid at the appropriate rate for that country until the spouse's expected age of death.

The internal rate of return is then computed as that rate of return at which the present value of the (negative) stream of contributions paid is equal to the present value of the (positive) stream of pension benefits. Appendix Table A3 gives the calculated values. Note the wide variation across countries but the almost universal fall in IRRs after the first decade. At just over 1%, the average IRRs for the generations born in 1930 and 1940, are likely to be well below *r* in equation (1), illustrating the 'implicit tax' from PAYG financing and the above-average returns obtained by the first generation. However *actual* cohort IRRs have typically been higher than those calculated in Table A3 because individuals have been permitted to retire earlier than age 65. I also use these IRRs at actual expected retirement dates as an alternative indicator variable.

The correlation matrix for these measures of public pension programme design show a strong positive correlation between the average generosity of the programme, as measured by Pension RR, and the contribution rate. Remembering that the latter is calculated from applying equation (2) above using the support ratio and the average replacement rate, this tells us that variations in contribution rates are almost wholly driven by variations in replacement rates rather than by differences in demographics – the correlation between support ratios and contribution ratios is of course negative. So the table shows that there would be a significant collinearity problem if we were to include both replacement rates and contribution rates in the same regression (quite apart from any econometric issues arising from the construction of the latter variable).

Second, there is a negative correlation (although not so strong) between the 'pension tax' variable and the contribution rate. This simply suggests that countries with highly redistributive (Beveridge) programmes have less costly public pension programmes than countries that link benefits more closely to earnings (Bismarck). Thirdly, and gratifyingly from an econometric point of view, the calculated 'IRRs at 65' do not strongly correlate with the other pension variables.

Correlation coefficients for calculated variables

Correlation	Contrib. rate	Pension RR	Pension tax	Support Ratio	IRR at 65
Contrib. Rate	1.0000	-	-	-	-
Pension RR	0.9500	1.0000	-	-	-
Pension tax	–0.4834	–0.5673	1.0000	-	-
Support Ratio	–0.6440	–0.3932	0.0854	1.0000	-
IRR at 65	0.0513	0.1431	–0.2586	0.1455	1.0000

Two other variables characterising the public pension programme are included in the regressions. The first, **Retirement test index**, measures the intensity with which a retirement test is applied to those over state pension age. This indicator variable uses information from OECD and the US Social Security Administration's description of country-specific pension programmes and takes 4 values as follows:

0 = no retirement or earnings test
1 = retirement or earnings test but deferral of pension permitted and earnings threshold for test>0
2 = retirement or earnings test but *either* deferral permitted *or* some earnings exempt from test
3 = full retirement test – pension receipt conditional on full retirement; no opportunity for deferral of pension.

The second, **Earliest pension age**, is the earliest age at which individuals can obtain the normal state pension, taken from the same source.

3.2. *Other variables*

Other control variables are included (although some are omitted from the illustrated specifications due to lack of significance). These include the Blanchard-Wolfers (2000) measure of **Demand shocks**, and **GDP growth**.

To capture capital market imperfection, I follow Jappelli and Pagano (1994) in constructing measures of financial repression (liquidity constraints), the argument being that differential changes in the availability of finance over time across countries may also affect household saving. Jappelli and Pagano (J-P) use three indices of credit availability: consumer credit as a percentage of NNP, credit to the financial sector as a percentage of GDP, and the maximum loan-to-value ratio in house purchase. The first of these is not available for a sufficient number of countries, but the other two indices can be updated from a variety of sources.[4] Note that 'credit to the financial sector' also include credit to firms, and that borrowing from banks by companies may be an indicator of the lack of development of an equity market rather than reflecting the lack of a credit market for consumers.

4. Empirical estimates

4.1. *Impact of programme design on household saving rates*

This section provides results on the impact of the design of the public pension programme on household saving rates. It departs from the traditional literature in Section 3.2 in considering explicitly design parameters of the programme in addition to 'traditional' measures of cost and generosity. Note that we are here assuming that *current* household saving is associated with the parameters of the pension regime calculated for a person in their mid-fifties expecting to retire at 65. Clearly the household saving rate is a weighted average of the saving of all age groups, and it is a strong assumption that young savers also expect the same public pension regime to be place when they retire. There are two reasons for using this approach. First, we simply do not have age-specific saving data for enough countries. Second, aggregate household saving is typically dominated by the discretionary (active) saving of people in late middle age (from standard empirical observations of the life cycle theory, as in Jappelli and Modigliani, 2003), which is exactly the point in the life cycle at which replacement rates, IRRs etc. are calculated here.[5]

Table 1 provides some simple descriptive statistics for the variables used in the analysis, some of which have already been described in greater detail in the previous

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4 From OECD *Economic Outlook*, the BIS, IMF *Financial Statistics* and HM Treasury's evaluation of the UK's housing market for the 'five economic tests' for membership of the European single currency.

5 On this last point, see the discussion of Feldstein (1974) and Leimer and Lesnoy (1982) earlier; our position of using expected replacement rates of people within a decade of retirement is perhaps midway between that of Feldstein (who uses current replacement rates of the elderly projected forward) and Leimer and Lesnoy who use actual outcomes *ex post.*

section or in the Appendix. Of particular note from Table 1 are the high variances of saving and contribution rates, and the range of the IRR variables and the pension (public pension) replacement rate. The 'pension tax' variable is an absolute tax rate and the mean is relatively low because the countries that have low values of α tend to have low contribution rates ('Beveridge' countries) so that [(1 $-\alpha$) × the contribution rate] is relatively low.

Table 1
Means, standard deviations, minima and maxima of variables

Variable	Mean	Std. Dev.	Minimum	Maximum
Dependent variable				
Household saving rate (%)	11.4	6.2	–3.6	24.9
Public pension variables				
Contribution rate (% wage bill)	25.1	9.6	11.6	57.7
Pension RR (% of wage)	59.8	17.3	28.9	120
Support ratio	2.5	0.36	2.0	3.7
Pension tax (%)	3.4	2.3	0.02	6.9
IRR (%)	3.1	2.3	–1.6	12.0
IRR at 65 (%)	2.0	2.2	–0.5	10.3
Retirement test index (0 to 3)	1.2	1.1	0	3
Earliest pension age (years)	61.6	3.4	55	68
Other variables				
Demand shock (% × 100)	0.2	7.4	–30.6	14.3
GDP growth (% × 100)	2.8	1.4	–1.0	5.8
Max LTV ratio (%)	76.1	11.7	50.0	95.0
Fin credit as % of GDP	61.4	31.5	21.0	169
Union density (%)	43.1	19.6	14.5	90.0
Employment protection index	2.3	1.1	0.2	4.0

Note: For list of countries and periods used, see Tables A1 to A3

As a benchmark for what follows, Table 2 provides three 'traditional' empirical specifications of the life cycle model which alternately utilise, as indicators of the public pension programme's impact on the household saving rate, the public pension contribution rate and the average pension (public pension) replacement rate. One of the specifications includes the additional 'financial repression' variables. The standard empirical model predicts that a higher **contribution rate** and/or a higher **pension RR** in the public pension programme (which, as we have seen, are strongly positively correlated) should reduce private household saving, with a likely 'offset coefficient' of between zero and unity. Standard life cycle theory (e.g. Modigliani, 1986) suggests that a higher **support ratio** raises household saving. The LCH theory also suggests that higher

GDP growth should affect saving positively and positive **demand shocks** might increase saving in the standard permanent income framework.

Table 2

Household saving rates, by measures of cost and generosity of public pension programme

Dep. Variable: Household saving rate	(1) Coeff. (Std. Err)	(2) Coeff. (Std. Err)	(3) Coeff. (Std. Err)
Contribution rate	0.14**	-	0.13*
	(0.07)		(0.08)
Pension RR	-	0.06*	-
		(0.04)	
Support ratio	4.25***	3.28***	4.34***
	(0.77)	(0.66)	(0.78)
Demand shock	0.12*	0.12*	0.10
	(0.06)	(0.06)	(0.06)
GDP growth (%)	-	-	0.39
			(0.28)
Max. LTV ratio	-	-	3.25
			(3.67)
Financial credit as % GDP	-	-	1.88
			(1.32)
1980s	–2.02***	–2.08***	–2.57***
	(0.47)	(0.50)	(0.51)
1990s	–2.80***	–2.82***	–3.11***
	(0.52)	(0.56)	(0.69)
Log L	–101.47	–101.94	–98.93
Wald χ^2 (25/28)	1145.5	1127.6	1246.9
	(0.000)	(0.000)	(0.000)

Notes:
Estimated by generalised least squares, weighted by civilian employment; country dummies included; standard errors in parentheses. ***=1%, **=5%, *=10% significance. N=63 (21 countries in 1975, 1985, 1995).

The estimates in Table 2 suggests that a higher contribution rate to the public programme (column 1) and a higher public replacement rate (column 2) *raise* household saving rates. The coefficients are weakly significant, but not large. These results are of course not consistent with the standard LCH-based substitutability hypothesis but they are not unknown in the cross-country/time series literature. Household saving rates *are* strongly positively associated with variations in the support ratio, as theory would suggest. The positive association with demand shocks is also consistent with theory.

There are large country-specific effects (not included) and evidence of a fall in household saving rates, *ceteris paribus*, in the later decades relative to the 1970s. Finally, the financial repression variables do not add explanatory power.

The financial repression literature in general suggests that household saving rates are *negatively* associated with indicators of liberalised credit markets, such as higher credit as a percentage of GDP or the maximum loan-to-value ratio, if higher deposits or own finance are required for purchase of consumer durables in less liberalised credit markets. However, as Jappelli and Pagano (1994) point out, these indicators are imperfect measures of underlying market liberalisation and, moreover, the development of credit market institutions may be associated with greater volumes of savings in formal, measurable, channels. The reason for including these variables here is that several of these countries have undergone significant changes in their credit and capital markets over the period. This last point also reiterates that all the specifications in this paper include country and time dummies – identification comes from within-group (country) changes, not from pure cross-country differences in institutions and public pension regimes. This may be one reason why our results differ from some other studies.

Table 3 presents our preferred specifications where public pension programme design features are included. From the discussion in the Section 2, the offset should be be greatest where the public programme is a close substitute to private saving. This substitutability, I argued, is highest where $(1 - \alpha)$ is low (i.e. **Pension tax** is low) and $(r - G)$ is also low (i.e. **IRR at 65** or **IRR** is high). So we should expect a *positive* impact of pension tax on household saving and a *negative* impact of IRR at 65 on saving.

These predictions are almost exactly confirmed by Table 3, with well-specified parameter values. A higher pension tax component is associated with higher household saving, whereas a higher average IRR on contributions reduces saving. Columns (1) and (2) differ in using the calculated IRR at age 65 and the IRR based on actual retirement date. There is little difference in parameter values between the two measures, and use of IRR at 65 is probably preferable simply because the IRR at actual retirement date may be affected by any induced retirement effect and because the likelihood is also improved. Including the pension replacement rate in the regression (not shown) does not affect these parameter estimates or their significance and the replacement rate variable continues to have the 'wrong' sign.

Table 3
Household saving rates, by measures of public pension programme design

Dep. Variable: Household saving rate	(1) Coeff. (Std. Err)	(2) Coeff. (Std. Err)	(3) Coeff. (Std. Err)
Pension tax	0.64***	0.57***	0.68***
	(0.19)	(0.19)	(0.17)
IRR at 65	–1.16***	-	–1.11***
	(0.21)		(0.20)
IRR	-	–1.09***	-
		(0.24)	
Support ratio	7.96***	7.27***	8.49***
	(0.99)	(1.00)	(1.01)
Retirement test index	–0.80	–0.79	–0.34
	(0.87)	(0.92)	(1.00)
Earliest state pension age	–0.25	–0.20	–0.26
	(0.18)	(0.19)	(0.18)
Demand shock	0.12**	0.13*	0.08
	(0.05)	(0.06)	(0.05)
GDP growth (%)	-	-	0.35
			(0.23)
Max. LTV ratio	-	-	6.38**
			(2.87)
Financial credit as % GDP	-	-	1.63
			(1.30)
1980s	–3.98***	–3.77***	–4.69***
	(0.55)	(0.58)	(0.56)
1990s	–3.82***	–3.55***	–4.23***
	(0.46)	(0.47)	(0.57)
Log L	–90.15	–93.14	–85.43
Wald χ^2 (28/31)	1668.2	1511.4	1947.8
	(0.000)	(0.000)	(0.000)

Notes:
Estimated by generalised least squares, weighted by civilian employment; country dummies included; standard errors in parentheses. ***=1%, **=5%, *=10% significance. N=63 (21 countries in 1975, 1985, 1995).

As before, the support ratio is positively and strongly associated with household saving, there are time effects (larger relative to the results in Table 2) and demand shocks enter with the correct sign. The two variables concerning the parameters of the retirement regime appear to have no effect on household saving.

Column (3) adds the financial repression variables and GDP growth. The latter has the ‘correct’ sign but is insignificant, and also reduces the significance of ‘demand shocks’, suggesting some collinearity. One of the financial repression variables is also significant, albeit the positive sign is not consistent with the standard argument that higher loan-to-value ratios reduce the need for saving (for example, for deposits and part-self finance of house purchases). Moreover, inclusion of these additional variables also heightens the reduction in saving in the 1980s and 1990s relative to the 1970s.

Given inevitable measurement problems in the calculation of these indicator variables, the results in Table 3 (especially when compared to Table 2) are perhaps surprisingly conclusive in suggesting that the design of public pension programmes matters if we are to understand the impact of such programmes on household saving rates.

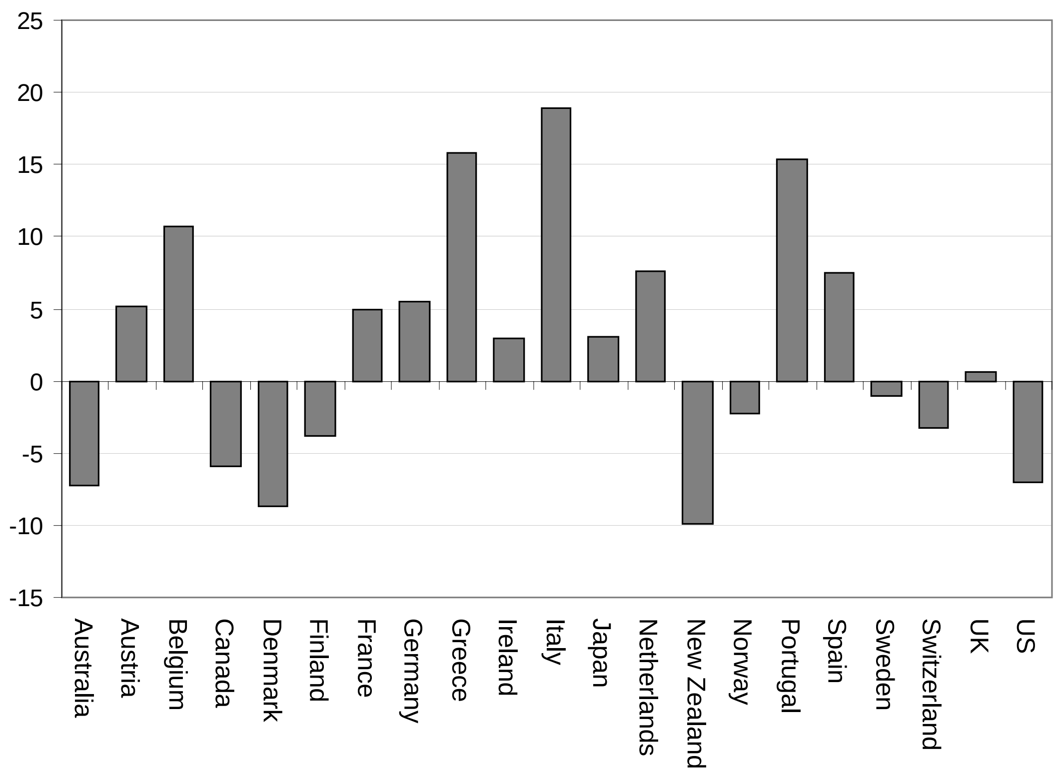
4.2. *Simulating public pension reforms*

The estimates in Section 4.1 suggested that there is a strong link between the design of the public pension programme and the household saving rate. Using these indicators of programme design, how would a given pension reform affect household saving rates? In this section, I simulate some simple programme reforms to show how changing the programme design might affect household saving rates given the parameter values derived earlier.

The link between low saving and a public pension programme has been at the heart of the US debate on public pension reform, although it is fair to say that elsewhere in the world, reforming public pensions in order to raise the saving rate has been very much a secondary consideration compared to other pressing motives for reform (rapid ageing, and the sustainability of the public finances). It is of course true that the development of a public pension programme lowers the measured saving rate simply because public pension contributions are not treated as 'saving' in conventional national accounts (Jappelli and Modigliani, 2003). 'Privatizing' the public pension programme by replacing it with, for example, a system of individual private retirement accounts would therefore raise the measured household saving rate. Moreover, as Gokhale, Kotlikoff and Sabelhaus (1996) point out, the increasing annuitization of retirement wealth implied by the development of pension programmes will also reduce other measured wealth in the economy. In their analysis, the fall in the US saving rate since the 1950s has been driven largely by demographics, by cohort-specific changes in preferences for consumption, and by growing annuitization of wealth. Engen and Gale (1997), in their survey of studies of public pension reform and saving, also add caution to the idea that public pension reform will significantly change household saving rates, once we allow for these measurement issues. However, we should not focus on what are essentially reforms that raise saving by redefining programme components as saving.

As a simple first step, we can examine the residual 'country effects' once we control the effect of the independent regressors. Re-estimating the equation in Table 3, column (3) and suppressing the constant, the marginal effects of the country dummies in the panel estimates are illustrated in Figure 1. From Figure 1, it is apparent that a number of the 'Anglo-Saxon' countries have negative intercepts whereas (particularly) some of the Mediterranean countries are characterised by above-average saving rates. Note in particular the US, where the country-specific saving rate is 7% below the average. However the *actual* US household saving rate was only 4.5% below the average over the period, suggesting that a combination of demographics, the design of the public pension programme in the US and the other independent variables raised the US saving rate relative to this crude counterfactual.

Figure 1
Household saving rates: country effects



Reflection on these US characteristics provides a simple explanation of why this is the case. The US support ratio is somewhat above average, due to more favourable demographic circumstances than other countries (especially in Europe) in the past, and higher labour force participation of, particularly, women. As Tables 2 and 3 show, this has a strong impact on household saving. Moreover, the US public pension programme's design is such as to reduce the offset on saving: the internal rate of return has been below average (at least in the first two decades – see Table A3) and the 'bend' points and other non-linearities in the programme provide departures from an 'actuarial-based' programme. Both characteristics, by the reasoning here, reduces the substitutability of the programme for private household saving.

A simple method of examining the reform of public pension programmes is to give a particular country the specific characteristics of another country's public pension programme whilst retaining the country's other characteristics (e.g. demographics, financial market development). This can again be illustrated by reference to the United States (experiments for other countries would obtain similar magnitudes).

Assuming outright abolition of public pension is not feasible, we might consider a stylised reform in which public pension was reduced to the bare minimum of an income-tested 'floor' to supplement a largely privatised system, such as is the case in Chile. Within the data set, Australia is the closest approximation to this with an average replacement rate some 15-20 percentage points below that of the US and extensive means-testing. We can recalculate the variable 'pension tax' for the US to have an Australian-style average replacement rate and value of $(1 - \alpha)$ and, to heighten the comparison, set the internal rate of return at 65 to zero. By the argument of preceding sections, this would be a public pension programme with very little substitutability for household saving, thereby raising the latter. Implementing this experiment, I calculate that this would only have a significant effect on US household saving in the last period, raising it by 0.6 percentage points from 5.2% to 5.8% (which is nevertheless a 12% increase in the saving rate).

Conversely, to illustrate where the US lies in the spectrum of programmes, we could have a counterfactual where the US programme is akin to a more 'Bismarckian' programme with a minimal 'pension tax' component and an internal rate of return at the 75^{th} percentile of the observed distribution of rates of return in the sample. By the analysis here, this should lower the household saving rate in the US still further. In fact, this reform has very little effect in the last decade, because the IRRs are closely bunched and the US's IRR is not particularly low. In the first two decades, however, had the US had such a generous system, the household saving rates would have been 0.5 percentages points lower (7.7 rather than 8.2) and 1.3 percentage points (5.5 rather than 6.8) – decreases of 6% and 19% respectively. These are not trivial numbers but they do suggest that, simple definitional considerations aside, public pension reform is not a 'magic bullet' for changing household saving rates – that is, once we consider practical public pension regime changes and not hypothetical simulations where public pension is abolished or where contributions to programmes are redefined as 'saving'.

5. Conclusion

This paper examines the impact of the design of public pension programmes on household saving rates using a short panel of OECD countries. Previous literature that considered the impact of public pension programmes on household economic activity, with very few exceptions, either treated public pensions solely as a substitute for private saving or, if interested in employment and unemployment trends, simply as a tax, using proxies for the generosity or cost of the programme accordingly. The contention here is that public pension contributions are neither simply another tax on wages nor a pure form of retirement saving.

By measuring how far returns to public pension within and across generations differ from those in an 'actuarial' scheme in any given setting, we are able to provide separate indicators of public pension programme design. Using these indicators, the paper shows that, the closer the public pension programme is to an 'actuarial-based' programme, the greater its substitutability for private retirement saving. In Disney (2004) I show that the impacts on labour force participation go in the opposite direction to the saving results (as the stylised theory would predict) although they are only robust for women. In contrast, a public pension programme that is more like a tax-and-transfer programme, with little link between individual benefits and contributions, has little effect on saving.

In the final section, I focus on how actual public pension reforms might affect household saving rates, using the United States characteristics to illustrate the point. The effects of public pension reform on saving are significant, although perhaps not as large as some reform advocates suggest. But it should be borne in mind that reforms that generate large effects on private saving often use highly stylised models of public pension programmes, and that much of the measured effect on private saving rates comes from accounting changes rather than changes in household behaviour. It would be interesting to focus on household data sets to pursue this issue further, and a few studies now focus on reforms to provide the 'policy experiments' required. So far, however, such studies have exploited the reform to estimate saving responses, but not analysed the content of the reforms themselves. The question of whether policy reforms can therefore be designed to increase saving remains an open issue.

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Appendix

Definitions of variables

Age-activity rate: Proportion of age group *i* at *t* economically active. Derived from *ILO* statistics website *LABORSTA* and from extrapolation where annual data unavailable e.g. Switzerland, UK.

Household saving rate: Average household saving rate as a % of GDP over the decade. Derived from OECD online data and (for 1970s) from Callen and Thimann (1997).

Pension RR: These are the average expected gross public pension replacement rates constructed by Blöndal and Scarpetta (1998), Table III.3 for 1961, 1975 and 1995. They are stylised indicators of what a 55 year old at each date could expect, in terms of public pension benefits relative to earned income at retirement, if that individual started work at age 20 (*ibid*, Box III.1). By interpolation (with adjustments where pension reforms seem to have had significant impacts, as in the United Kingdom in the late 1970s) and by extrapolation to the mid-1950s, I have used these data to construct mid-decade estimates of expected replacement rates for a 55 year old in 1955, 1965, 1975, 1985 and 1995. The resulting data are given in Table A2. It is both striking how much replacement rates differ across countries, and also how, in many countries, these rates have increased systematically over time.
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The support ratio: ILO data on activity rates gives the ratio of actual workers aged 15-59 to people aged over 60. To convert this ratio into an effective support ratio, I make a couple of additional assumptions. First, I remove all workers aged under 20 and over 60, on the grounds that their contribution to total contribution revenue is likely to be low (low incomes and/or low hours). Secondly, it should not be assumed that all people over 60 receive a pension from the public programme – as described earlier, most countries have a contribution requirement underpinning eligibility for benefits. As an approximation, I take all men as eligible for a pension, and the proportion of women eligible as equivalent to the highest rate of participation observed in each decade's cross-section of participation rates for women. So, for example, if the highest 5 year age band participation rate is 70%, I assume that this percentage will receive a full pension. Since non-contributors are generally entitled to *some* benefits, especially widows (and widowers without their own pension rights), I use information on rights to survivors benefits (which varies across these countries from 0% to 100% of the original award) from the US Public pension Administration's *Survey* of country pension programmes.

The data are depicted in Table A1.

Actual contribution rates, although sometimes used in 'tax wedge' calculations, are almost useless for purposes of estimating effective tax rates. Some countries, such as Australia and New Zealand, do not levy separate contributions at all – in these countries, public pensions are financed out of general taxation. In other countries, such as Greece and Italy, effective contribution rates have understated the 'true' costs of paying pensions, for many years being subsidised by direct budgetary transfers and borrowing. Finally, in some other countries, assets are accumulated within the public pension programme (such as the US public pension Trust Fund), which implies that the measured contribution rate exceeds that required to finance current pension expenditure. In contrast, some countries, such as Japan, have systematically run down accrued public pension assets over time. Finally, some countries (such as the United Kingdom) can more-or-less automatically adjust contribution rates to finance outgoings, whereas other countries (such as the United States) require legislation to vary contribution rates, and approval is not always forthcoming.

Pension contribution is *Pension RR* divided by *The Support Ratio*

Pension tax: Blöndal and Scarpetta (1998) report expected pension replacement rates for four categories of 55 year old contributors – single people and couples, on average earnings and at 66% of average earnings. These calculations capture two dimensions of departures from intragenerational actuarial fairness – that contributors at different earning levels are treated differently and that contributors in couples may or may not get differential benefits relative to contributions (especially when their partners are not working). To give an example from the Blöndal and Scarpetta data, the 1995 figures for replacement rates for Belgium are singles at mean earnings: 60%, at 66% of mean earnings: 60%; couples at mean earnings: 75%, at 66% of mean earnings: 75%. Clearly in one dimension there is approximate actuarial fairness (earnings level) but not in another (singles v. couples). Compare this with Australia where the respective replacement rates are 37%, 24%, 62% and 41%, and where there are departures in both dimensions.

The following indicator is constructed: if the four Blöndal and Scarpetta expected replacement rates are identical for each country-time observation, *Pension tax* is zero. If the rates vary, then the coefficient of variation of the replacement rates gives an approximate measure of the departure from actuarial fairness in each country and time period (the normalisation does not affect the ranking – a similar ordering would occur if, say, the mean square error was used).

IRR at 65: For each of the 22 countries examined in this study, the average replacement rates serve two purposes. First, they permit us to construct expected pension benefits for three cohorts of individuals in each country – those aged 55 in respectively, 1975, 1985 and 1995. I term these three cohorts as those born in 1920, 1930 and 1940, who are assumed to retire in, respectively, the mid- 1980s, 1990s and 2000s.

Given these values, the internal rates of return are constructed as follows. In each decade, the contribution rate is applied to average earnings, which grow in each decade in real terms at the average rate reported in OECD data. It is assumed that the first cohort, born 1920, only starts contributing in 1950 (to capture the advantage accruing to the earliest generation) but that the subsequent generations contribute into their fourth (or even fifth) decade of work, depending on average retirement age. The replacement rate is then applied to real earnings at retirement, and the pension is increased in line with subsequent earnings growth if earnings indexation is in place. Many countries indexed benefits to earnings until the 1980s; thereafter shifts to price indexation or partial indexation are common. Expected age of death is taken from Blöndal and Scarpetta (checked on ILO data) with survivors' benefits paid at the appropriate rate for that country until the spouse's expected age of death.

The internal rate of return is then computed as that rate of return at which the present value of the (negative) stream of contributions paid is equal to the present value of the (positive) stream of pension benefits. In Disney (2004), I present some calculations from other sources of IRRs for particular cohorts to compare with these numbers (e.g. from

Germany, Italy and the UK – most other countries in this sample have had no comparable calculations to my knowledge).

Retirement test index and *Earliest pension age* are described in the text.

Demand shocks is the Blanchard-Wolfers (2000) measure of changes in aggregate demand, as described at http://econ-wp.mit.edu/RePEc/2000/blanchar/harry_data/.

Union density, as described by Nickell and Layard (1999) contains only cross-country variation in that source. Time variation for this variable was obtained by exploiting information on union density across countries over time held at Cornell University. See the document:
http://www.ilr.cornell.edu/library/downloads/FAQ/UNIONSTATS2002.pdf.

Employment protection index: This variable is the time-varying index constructed by Blanchard and Wolfers (2000) and described at their website cited above.

Table A1
Effective support ratios of workers to pensioners, 1955-95

Country	*1955*	*1965*	*1975*	*1985*	*1995*
Australia	2.63	2.68	2.82	2.80	2.78
Austria	2.61	2.12	2.12	2.28	2.28
Belgium	2.12	1.93	1.99	2.07	1.96
Canada	3.08	3.07	3.20	3.20	3.05
Denmark	2.82	2.37	2.46	2.76	2.79
Finland	4.12	3.26	3.13	2.94	2.66
France	2.46	2.29	2.46	2.53	2.34
Germany	2.95	2.37	2.45	2.62	2.46
Greece	3.22	2.44	2.09	2.05	2.08
Ireland	2.21	1.94	2.21	2.37	2.61
Italy	2.90	2.43	2.35	2.18	2.00
Japan	4.42	4.05	3.68	2.94	2.25
Luxembourg	2.50	2.10	2.05	2.27	2.22
Netherlands	2.27	2.27	2.37	2.53	2.56
New Zealand	2.77	2.63	2.78	2.83	2.95
Norway	2.35	1.96	2.03	2.13	2.32
Portugal	2.63	2.20	2.61	2.60	2.34
Spain	3.16	2.55	2.61	2.46	2.22
Sweden	2.35	2.05	2.06	2.08	2.19
Switzerland	2.63	2.39	2.35	2.43	2.41
UK	2.27	2.09	1.98	2.01	2.10
US	2.68	2.53	2.53	2.63	2.75
Average	*2.78*	*2.44*	*2.47*	*2.49*	*2.42*

Source: ILO online data and own calculations as described in Disney (2004).

Table A2
Effective contribution rates to public pension programmes in OECD countries 1955-95 (%)

Country	*1955*	*1965*	*1975*	*1985*	*1995*
Australia	7.3	9.2	11.6	13.2	14.7
Austria	30.5	37.5	37.5	34.9	34.8
Belgium	34.2	37.1	35.4	33.3	34.4
Canada	10.2	12.0	14.1	15.1	16.9
Denmark	12.7	16.2	17.2	17.9	20.1
Finland	8.5	13.6	18.7	20.2	22.5
France	20.3	24.1	25.4	25.2	27.7
Germany	20.4	25.3	24.3	21.9	22.4
Greece	15.5	25.4	38.2	48.8	57.7
Ireland	17.4	17.9	13.1	14.4	15.2
Italy	20.7	25.0	26.4	32.5	40.0
Japan	5.6	9.0	14.7	18.1	23.2
Luxembourg	32.0	38.1	39.1	38.1	42.1
Netherlands	14.2	17.0	20.2	18.6	17.9
New Zealand	11.6	13.8	15.5	18.4	20.8
Norway	10.7	20.2	30.2	28.4	25.8
Portugal	32.4	37.2	29.5	30.7	35.4
Spain	15.8	19.6	19.1	30.5	45.0
Sweden	22.9	30.8	37.4	36.3	33.9
Switzerland	10.8	15.8	22.0	20.8	20.4
UK	14.7	16.0	17.1	20.8	23.7
US	14.6	17.0	19.4	20.0	20.4
Average	*17.4*	*21.7*	*23.9*	*25.4*	*28.0*

Source: Author’s calculations, using Table A1, interpolated data from Blöndal and Scarpetta (1998), and text equation (2).

Table A3
Internal Rates of Return to public pension programme contributions by cohort: Common retirement age at 65

Country	*Cohort b.1920*	*Cohort b.1930*	*Cohort b.1940*
Australia	1.63	-0.01	1.19
Austria	2.71	1.05	1.11
Belgium	1.06	0.12	1.10
Canada	2.10	0.41	0.74
Denmark	1.67	-0.05	1.42
Finland	5.34	1.75	1.60
France	3.03	1.03	1.20
Germany	4.58	2.35	1.34
Greece	3.04	0.14	0.60
Ireland	-0.30	0.32	0.08
Italy	5.84	2.87	0.99
Japan	6.73	2.66	1.79
Luxembourg	-0.26	-1.39	-0.24
Netherlands	10.32	5.67	3.32
New Zealand	0.50	-0.30	0.35
Norway	2.86	-0.16	1.51
Portugal	6.80	4.34	2.66
Spain	7.04	4.42	3.59
Sweden	5.40	2.10	0.89
Switzerland	2.56	0.09	-0.53
UK	0.39	-0.42	0.35
US	0.45	-0.41	1.09
Average	*3.34*	*1.21*	*1.19*

Source: author's calculations

Working Paper List 2006

Number	Author	Title
06/04	Paul Mizen & Serafeim Tsoukas	Evidence on the External Finance Premium from the US and Emerging Asian Corporate Bond Markets
06/03	Woojin Chung, Richard Disney, Carl Emmerson & Matthew Wakefield	Public Policy and Retirement Saving Incentives in the U.K.
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Working Paper List 2005

Number	Author	Title
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05/01	Simona Mateut, Spiros Bougheas and Paul Mizen	Trade Credit, Bank Lending and Monetary Policy Transmission