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Special Articles

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VALUING IRELAND'S PENSION SYSTEM

Shane Whelan[*]

Abstract

Despite considerable research, no consensus has yet emerged on the design of a sustainable pension system for Ireland. This paper takes a novel market-consistent approach and, in so doing, challenges the assumptions underlying the costing of alternative systems presented in Pensions Board reports (2005, 2006). It is shown that by ignoring investment risk and its consequences, the cost and value of pensions are materially understated. It is argued that risky investment strategies are not appropriate for modest or mandated pension savings and they propose, at the very least, that the state develops and maintains a market in index-linked stock to help pension savers manage investment risk. It is shown that a system based on mandatory personal pension savings in low risk government guaranteed investments is functionally very similar to a sustainable pay-as-you-go (PAYG) system. The two systems are contrasted from the perspective of value-for-money for contributors. We conclude that the sustainable PAYG is superior, delivering pensions of the order of one-fifth higher for the same level of contribution due to lower administration costs. Accordingly, we propose a better solution than simply the state maintaining a market in index-linked securities: Ireland's current PAYG system should be developed into a sustainable version that provides all mandated pensions.

1. Introduction

The last couple of years have been a time of unprecedented research within both the pension industry and academia on the functioning of the pension system in Ireland. The activity was sparked in February 2005 by the Minister for Social and Family

Affairs when, after consultation with the Government, he requested the Pensions Board bring forward a full review of the Irish pension system. Two substantial reports were prepared under the aegis of the Pensions Board, *National Pensions Review* (2005) and, at the further request of the Minister, a supplemental report on a mandatory pension system, *Special Savings for Retirement* (2006). These reports, when coupled with survey studies of the operation of the existing system (for example, Hughes and Watson (2005); Steward (2005); Whelan (2006); Department of Social and Family Affairs (2005)), set out a comprehensive overview of the current system and possible alternatives.

One of the issues central to the debate is the sustainability of our current system against the forces of reducing fertility, increasing longevity and the demise of the occupational defined benefit pension scheme outside of the public sector. Of course, Ireland is not alone in facing these challenges and, in fact, the adverse trends are somewhat less advanced in Ireland than in other developed economies. Accordingly, there is also a rich international literature on pension policy, complete with case studies of early implementation. Influential studies are World Bank (1994, 2005), with wide ranging discussion of the issues presented in, for instance, Barr (1998; 2000; 2001; 2002). Case studies of special interest are the recent fundamental reforms to the Australian and New Zealand pension systems, given their similarities with the Irish system until recently. Given the integration of our labour markets, the current proposals for pension reform in the UK in the Turner Reports (2004; 2005; 2006) and the UK Pensions White Papers (2006a; 2006b) are of particular interest. Indeed, Ireland, the UK, New Zealand and Canada are currently the only developed economies where the state pension is designed to alleviate poverty rather than, as elsewhere, designed to provide income replacement in retirement.

It seems we have never been better informed on pensions issues, nor so much confused. Despite the focus on pension policy in Ireland over the last couple of years, no consensus had emerged to help narrow the range of options in the forthcoming Green Paper. The reports of the Pensions Board reflect the conflicting divisions of the representatives of the different factors of production in the economy, with labour (represented on the Board by the trade union movement) broadly supportive of any increase in coverage or adequacy of pension, and capital (represented by an employers' association) broadly opposed to any such extension. This could reasonably have been anticipated as it has been the perspective of the parties consistently over at least the last hundred years (see McCashin (2004), Whelan (2006)). The surprise was that the representative of the Minister of Finance, and therefore the state, did not agree with the aims of pension policy (viewing them as more aspirational than firm targets) and generally opposed any measure that might increase the cost to be borne by the state. The Pensions Board did not achieve a consensus on principles of system design or financing, so its recommendations were rather piecemeal and unadventurous.

Yet a fundamental change in the landscape of pension provision in Ireland is upon us. Projections in the Pensions Board (2005) assume that the occupational defined benefit scheme outside the public sector will dwindle from now providing one-third of the total pension coverage in Ireland to nought in 50 years' time. The Board is relying on policies to give further incentives to volunteer defined contribution arrangements to both fill the void thus created and go on to achieve the stated 70 per cent coverage targets (from the current 52 per cent coverage). If a mandatory system is envisaged then the Board propose a mix of a defined contribution arrangement with an increased level of the flat rate state pension. Yet, in terms of the adequacy target to replace 50 per cent of income on retirement, the Board (2006, p. 33) admits the superiority of the defined benefit design.

The Board anticipates a fundamental shift in the design of pension coverage in Ireland from defined benefit to defined contribution.[1] Yet there is little discussion on the key differences between these designs. Indeed the extensive costings provided in Pensions Board (2005, 2006) reports on alternative systems conceal the significance of this change by ignoring investment risk and its possible consequences and, as such, the figures presented are not market-consistent. In this paper, we explicitly take account of investment risk at its market price. Quite a different picture emerges from this novel approach. Making due allowance for the market price of risk more than doubles the cost of pensions presented in Pensions Board (2005, 2006) reports. The appropriateness of a risky investment strategy for modest and mandated pension savings is challenged and, as a key and costless policy action, it is proposed that, at a minimum, the state develops and maintains a market in index-linked stock to allow pension savers to manage investment risk.

The commitment of the state to maintain a market in index-linked securities is simply an undertaking that future taxation revenues be applied to meet its obligations under the debt instruments. This commitment creates a system that is functionally almost identical to the PAYG system, under which future taxation meets the costs of the future pensions. The two systems are contrasted – a system based on compulsory personal pension savings in low risk investments and a mandatory pay-as-you-go (PAYG) approach. It is shown that both systems sustainably deliver very similar returns to contributors before administration expenses. The PAYG approach is shown to possess a number of theoretical

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[1] In fact, the proposal made by the Pensions Board to grant higher rate tax relief to employees on pension contributions can be expected to accelerate further the demise of private sector defined benefit schemes. Under the proposal, for employees on the standard rate of tax, it would be financially more advantageous for the employer to cease making provision through a defined benefit scheme and increase the salary of employees correspondingly. By so doing, if the employee saves the salary increment in a pension arrangement, s/he can be better off (as tax relief is at the higher rate) and the employer no worse off (as no employer PRSI contributions are levied on the saved increment).

and practical advantages over the alternative. Materially, when the lower administration charges associated with the sustainable PAYG system are allowed for, the PAYG system can be expected to produce pensions of the order of 20 per cent higher for the same contributions than the alternative system.

Before concluding, we take a brief look at the pension systems in the very long term, and the challenges posed by fertility rates below replacement.

2. Pricing Investment Risk

It is often supposed that the costs of production are threefold, corresponding to the rewards of labour, enterprise, and accumulation. But there is a fourth cost, namely risk; and the reward of risk-bearing is one of the heaviest, and perhaps the most avoidable, burden on production.

J.M. Keynes, Preface to *A Tract on Monetary Reform* (1923).

The essential difference between the defined benefit pension scheme and the defined contribution scheme is where the investment risk resides. Under the defined contribution scheme, investment risk is borne by the pension saver and, on retirement, the pensioner. The investment risk is very material, but it does have a market price so it can be valued.

Let us illustrate how to estimate the market price of investment risk. Consider a pension saver who wishes to provide a pension of a unit of wages at retirement from his 65th birthday until his assumed death on his 85th birthday. The present value of such a pension is clearly a function of the saver's current age and the rate of return above wage growth his investments earn both prior to and after retirement. For simplicity, we assume the same rate of return on investments both before and after retirement. Figure 1 outlines the present value of such a pension for a person at various ages and for various assumed rates of return above wage escalation.

The graph illustrates well the sensitivity of the present value of the ultimate pension to the rate of return above salary growth. As developed later in this section, the graph can be used to price investment risk for a pension saver.

Individual pension savers must be amongst the most risk-averse savers in the economy. Indeed, the arguments for mandatory pension provision become especially convincing only when the lack of pension provision at a certain minimum level triggers an obligation on society to make good the shortfall. So society's concern is to ensure that everyone has a certain *minimum* pension. Accordingly, national pension policy is primarily concerned with those making modest provision, which must be invested in securities that promise the most secure pension.[2]

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[2] Equivalently, if it is argued that such savers can tolerate investment risk then the level of compulsory savings is clearly set at too high a level. Those saving more than that required to provide the minimum required pension may, of course, assume a higher level of investment risk once the probability of achieving the minimum pension is not lowered.

Figure 1: Present Value of a Pension of One Unit of Wages Payable for Twenty Years from Age 65 Years, for a Person at Various Ages, as a Function of Investment Return above Wage Escalation
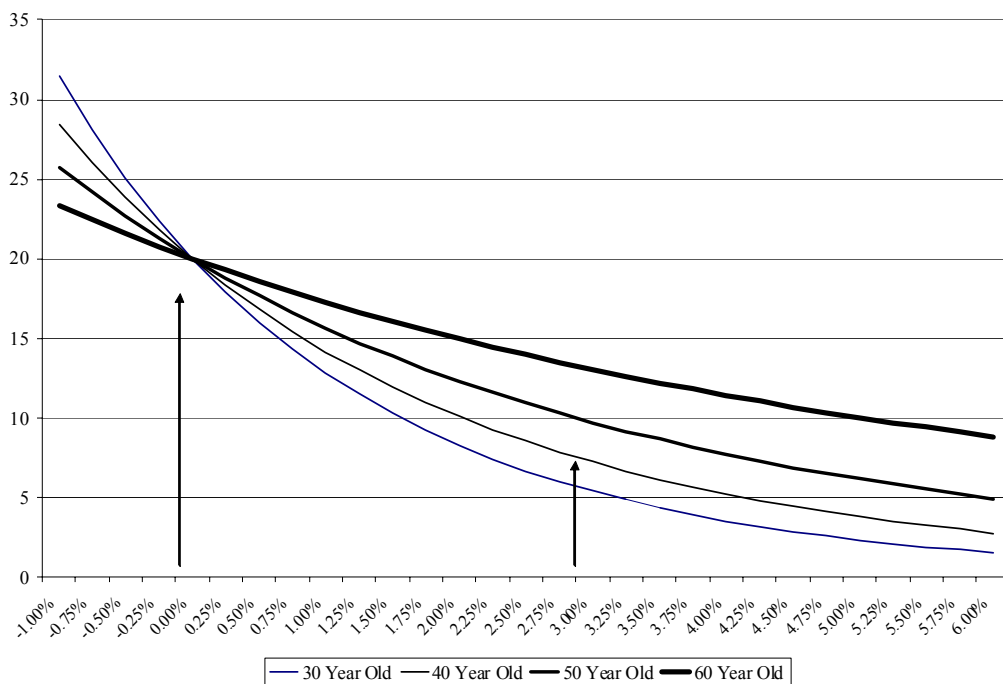
The minimum pension required by society should be at least inflation-linked to maintain purchasing power or, better, wage-linked, as relative property measures are arguably more appropriate in a developed economy. The least-risk investment strategy for such savers is to invest in securities the proceeds of which are guaranteed to rise in line with inflation (ideally wage inflation but, failing that, consumer price inflation). Bonds with proceeds linked to consumer price inflation have been issued in many euro economies so by comparing the guaranteed real return from these assets with the best estimate of the proceeds from more risky assets, an assessment can be made of the market value of the risk in the risky asset.

So the least risk investment strategy – and the most appropriate investment strategy for modest pension savers and mandated savings – is to invest in index-linked bonds of suitable duration. Taking real yields on long-term state guaranteed index-linked bonds to be of the order of 2 per cent (consistent with current market rates) and real wage escalation to be of the order of 2 per cent per annum (which is of the order of wage increases seen over the long-term past) then the return differential above wage escalation is 0 per cent. Consulting Figure 1 a crude approximation to the market price of such a pension would be 20 wage units per unit of pension from age 65 years (i.e., the saver's post-retirement life expectancy), irrespective of the current age of the saver.

Now investing in more risky assets can be expected to increase the expected return. Assuming, for instance, a diversified portfolio of equities gives a real return of 5 per cent per annum on average over the long term then the expected return above wage escalation is 3 per cent per annum. Consulting Figure 1 indicates that the present value of such a pension is 7.2 units for a 40 year old (with a higher value for older persons and lower for younger ones). In our example, the market cost of the pension to a 40 year old, assuming equity risk, is 7.2; the cost with no risk is 20; so the market cost of the investment risk is 12.8. We note the materiality of investment risk in this illustrative example: the cost of investment risk is almost double the present value of the pension assuming equity risk. Used in this manner, Figure 1 gives a rough-and-ready estimate of the market value of a pension, assuming different levels of investment risk, or, as used in the example, it gives the market price of the investment risk assumed.

The above example was not arbitrarily chosen, but reflects assumptions made in the Pensions Board reports (2005, 2006). In Table 1, we summarise the real returns, investing expenses and the real rate of wage growth in the very long term assumed in the Pensions Board (2005, 2006) and highlight the net return above wage growth it entails for different investment strategies.

Table 1: Real Returns, Investing Expenses and Real Wage Escalation, Based on Assumptions in Pensions Board Reports (2005, 2006)

Investment Strategy	Real Return	Investing Expenses	Real Salary Increase[3]	Net Return above Salary Escalation
	% p.a.	% p.a.	% p.a.	% p.a.
100% Equities	6.00	0.65	2.0	+3.35
100% Government Bonds	1.75	0.10	2.0	-0.35
100% Index-linked Bonds	1.75	0.10	2.0	-0.35
75% Equities, 25% Bonds	4.94	0.51	2.0	+2.43
50% Equities, 50% Bonds	3.88	0.38	2.0	+1.50
100% Equities up to 10 Years to Retirement then 100% Bonds	4.50	0.42	2.0	+2.08

The costings for the different pension systems in Pensions Board (2005, 2006) reports do not allow for the market price of the risk assumed. Accordingly, in our earlier example, the cost of the pension for a saver investing wholly in equities is put at about 7.2 by the method underlying the figures produced by the Pensions Board. This is materially different from the market-consistent value of 20, which assumes minimal investment risk.

The detailed figures of the Pension Board reports assume the individual pension saver will invest over half in equities on average,

[3] Real salary increases are estimated at 3 per cent per annum currently falling to a long-run average of 2 per cent per annum from the year 2021. Accordingly, the table above somewhat overstates the return above wage escalation up to 2021.

and the state, through the National Pensions Reserve Fund will invest four-fifths or so in equities (Pensions Board 2005, pp. 215-6). By ignoring risk and its possible consequences, the mathematics lead to the conclusion that the more risk taken the less one needs to save – the complete opposite to the more pertinent logic that the more risk undertaken the greater one must save for a certain minimum level of pension. In fact the figures provided in the reports lead to many anomalies – that pensions are cheapest if provided by the state (as the National Pensions Reserve Fund's higher risk tolerance is assumed to produce a real return of 4.6 per cent, higher than the 3.6 per cent real return assumed for defined contribution arrangements) and that, in fact, the state can turn a worthwhile profit by issuing bonds at a 1.75 per cent real return and using the proceeds to buy equities with a real return of 5.35 per cent per annum. These anomalies are a consequence of taking credit for investment risk by assuming higher returns, and not modelling the consequences of that investment risk.[4]

We propose that the more appropriate value to use is the market-consistent value. Aside from placing a considerably higher present value on any pension, the market-consistent approach also entails dramatically higher contribution rates to provide for a pension. Figure 2 graphs the level contribution rate required over a working lifetime (assumed to be 40 years up to age 65 years) to provide for a pension of half salary from age 65 years at different rates of return above wage growth. Again, death is assumed to occur on the pensioner's 85th birthday.

The marked dependency of the contribution rate on the assumed return is evident. Note in particular, that the contribution rate is 25 per cent of salary per annum to provide a pension of half salary at a 0 per cent rate of return above wage escalation while at a

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[4]It must be said that the costings in the Pensions Board reports (2005, 2006) reflect an approach common in the pensions industry in Ireland, the UK and elsewhere. It is difficult to model investment risk satisfactorily (see Appendix) whence our adoption of a market-consistent approach to investment risk. Note that MacDonald and Cairns (2007) attempt to model explicitly the impact of investment risk on retirement behaviour in an economy where each individual bears investment risk and has complete discretion of the investment strategy pursued. They conclude that "…the unpredictability of the financial markets could produce ambiguous and unmanageable retirement ages…" and note that the most stable outcome is produced when everyone maintains very high concentrations in index-linked bonds.

Figure 2: Level of Contribution Rate as a Percentage of Salary over Working Life of 40 Years to Provide a Pension of Half Salary from Age 65 Years under Various Assumed Rates of Return Above Wage Escalation
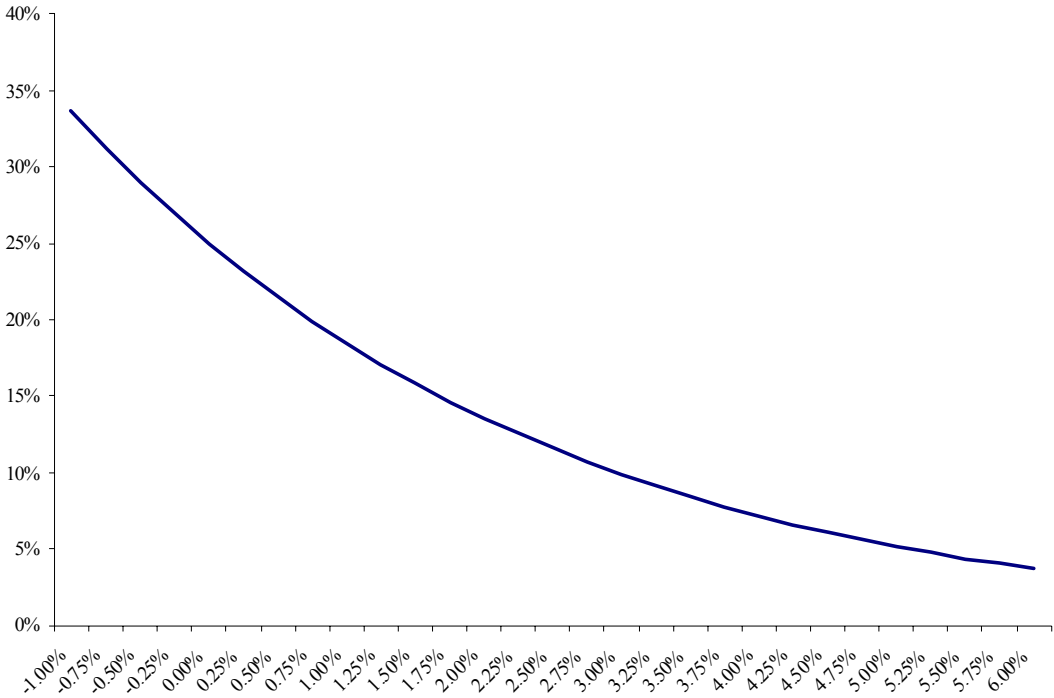
positive 3 per cent differential the contribution rate is 9.9 per cent.[5] Figure 2 also highlights the cost of achieving the national pension target of half salary under different return assumptions. If investment risk is minimised then the real investment return over salary growth is of the order of 0 per cent, pointing to a market-consistent cost of about one-quarter of salary per annum over the entire working lifetime. If, further, an allowance of, say, 1 per cent per annum is made for administration costs (see discussion later), then the cost of the pension is about one-third salary in each year. If such a level of saving appears unrealistic then so too is the national pension target.

The price of the investment risk determined above is sensitive to the real returns assumed on different asset classes and to real wage escalation. Appendix I sets out a concise overview of the literature

[5] A case can be made that public sector pensions, which have a state guarantee like index-linked stock, should be valued at 0 per cent in Figure 2 while other occupational pensions with largely equity-backed security should be discounted at 3 per cent to account appropriately for the higher risk. This suggests that the market value of public sector pensions is of the order of 25 per cent of salary per annum while the equivalent pension from the private sector only about 10 per cent. If a true market approach is adopted, this difference of 15 per cent or so per annum should be taken into account in 'benchmarking' public sector remuneration against that of the private sector.

in this area and provides data from the markets that broadly support the figures in Table 1. The Appendix also discusses the considerable uncertainty surrounding the expected return from risky assets, especially in the context of those targeting a preset pension. It is the considerable uncertainty in the performance of risky assets over both the long and short term that leads to such high rewards for risk bearers. In short, we cannot build a durable pension system on the shaky and unreliable foundation that is provided by the expected returns from risky assets.

The above considerations, centring on investment risk and its market price, lead to a rather simple policy recommendation: the state should issue and maintain a broad and liquid market in index-linked bonds with maturities up to 60 years. The recommendation imposes no cost on the state, as the conversion of current outstanding nominal bonds to index-linked bonds will be done at market rates. Yet the simple innovation gives pension savers instruments to reduce significantly the risk in pension saving and, by so doing, gives transparency to the ultimate pension (a key characteristic of the defined benefit plan). Such instruments provide a valuable safeguard against the mis-selling of investment risk to the risk-averse pension saver. For mandatory savings, the presumed need to provide for a minimum level of pension entails that investment risk be eschewed so investment in index-linked securities should be mandatory.[6] Indeed, as developed in the next section, the insight that compulsory pension savings should be invested in index-linked state guaranteed stock leads on to a greater insight that produces a more efficient method to provide minimum pensions.

The above recommendation echoes calls for an index-linked bond issuance policy to help manage pension liabilities by, amongst others, Healy (1996), Fitzgerald (2005), recent petitions from leading industry-wide pension schemes and from professional bodies such as the *Society of Actuaries in Ireland*. Other mechanisms to transfer risk away from the pension saver have been made by Kehoe (2003); IAPF (2005); Whelan (2005a, 2006), but the simple market-based approach of issuing index-linked gilts has the considerable merit that it is costless and straightforward to implement.

We conclude this section by summarising. The defined benefit scheme design is ideal from the perspective of the pension saver as it shifts investment risk and gives transparency to the quantum of pension ultimately payable. Defined contribution arrangements can achieve these key benefits if there is a broad and liquid market in index-linked bonds. The state, at negligible cost, can maintain a market in index-linked bonds. The simple innovation of an index-

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[6] Some have suggested the state guarantee a minimum return on compulsory retirement accounts. This suggestion is incompatible with investment freedom as the guarantee is a put option for the investor, the value of which is increased by following a more risky investment strategy. In short, the presence of such a guarantee encourages risk-taking by investors at the cost of the state. The logic for compulsory saving leads, as outlined in the text, to controls on the investment freedom permitted.

linked market in Ireland will enable pension savers to provide low risk pensions for themselves. However, if compulsory savings in defined contribution arrangements is proposed (as outlined in Pensions Board (2006) report) then investment in such state guaranteed index-linked stock should be mandatory to provide for a minimum pension. This later conclusion points to an even better design of a compulsory pension savings scheme, as developed below.

3. Financing Pensions: to Fund or Not to Fund?

To allow retirement in an economy, the retired must have claims over current production to facilitate their consumption when not themselves producing. The claim over current production can be organised in two ways: via the financial markets or via the state through the so-called 'social contract', which requires that the working generation contribute on a pay-as-you-go (PAYG) basis to the retired generation. The financial contract route is pre-funded, as the pension provider builds up a portfolio of financial claims. The PAYG approach is often identified with an unfunded approach. The Pensions Board (2005) is equivocal on whether to pre-fund or not, arguing "…the difference between funding and PAYG is only a different means of organising the future transfer of assets…. The difference between funding and PAYG is the difference between the uncertainty of future asset values and the uncertainty of future taxation" (p. 57). The report fails to discuss the issue further simply noting that "the economic theory of funding versus PAYG is quite involved and its relevance to the assignment in hand is questionable" (ibid. p.184).

Let us consider a little deeper the simple policy recommendation above that the state maintain a market in index-linked securities, sufficiently broad and deep to allow pension savers to monitor and manage investment risk. Such a commitment is simply an undertaking by the state that future taxation revenues be applied to meet its obligations under the debt instruments. This commitment creates a system that is functionally almost identical to the PAYG system, under which future taxation meets the costs of the social obligation. The key differences between the contrasting system – defined contribution arrangements investing in government guaranteed index-linked stock or a PAYG scheme – may conveniently be discussed under two main headings: pricing or value-for-money and administration.

4. Pricing or Value-For-Money

In capital markets, the price of index-linked stock, like any other financial asset, is set by supply and demand in the context of the price of all other capital market securities. The extensive Appendix I, shows that, on average over the long term, a real return of about 2 per cent per annum or so has been delivered on reasonably low risk investments. With wages growing in real terms by about 2 per cent per annum on average over the long term, this gives a long- term return above wage escalation of approximately 0 per cent per

annum. It is of primary concern to the contributors of any PAYG system that it can deliver comparable returns.

The mathematics underlying the PAYG approach gives a very neat answer to the return sustainably deliverable under such a system (anticipated in Samuelson (1958)). For sustainability, we must consider an idealised stationary population, where the number of workers entering in any year equals the number of deaths. Consider such a stationary population with workers contributing a fixed percentage of wages and total contributions divided as pension payments to the retired population. Viewed from the perspective of an individual, the internal rate of return from such a system is calculated by solving the equation of value that puts the present value of contributions paid over a working lifetime (discounted at the required rate of return i equal to the present value of the pension from retirement (discounted at the same rate of return, i. Intuitively, the contributor will get out everything he puts in (by the stationary assumption) and, as each calendar year passes, the increase will be in line with the increase in wages. This leads us to speculate that the rate of return, i, will be the same as the rate of wage escalation. This insight turns out to be true (see endnote[†]). In short, in a stationary population, the PAYG system of financing delivers a return comparable to the expected return on a low risk portfolio of assets. Indeed, the PAYG system is somewhat superior in several respects, in that: (i) the return to contributors is explicitly linked to wage escalation, a linkage that no existing capital security gives but is ideal to maintain relative income levels in an economy; (ii) the rate of return is applied to future as well as current contributions, a guarantee that is impractical to synthesize through the capital markets; and (iii) it ensures that the ultimate pension is not dependent on the performance of the markets, the investment policy pursued by the individual, the solvency of financial institutions, or other factors that could conspire to frustrate the objectives of pension policy. In place of all these risks, it substitutes the single risk that the social contract will be honoured by future generations.

The above result only applies to stationary working populations. The working population in Ireland is not stationary but has been growing rapidly of late. The internal return to the retired in a strictly operated PAYG system when the workforce is growing is above the weighted average growth of wages in the economy as there is an excess of contributors. This extraordinary value for money was remarked upon by Paul Samuelson[7]: "…the beauty of social insurance is that it is actuarially unsound. Everyone who reaches retirement age is given benefit privileges that far exceed anything he has paid in… A growing nation is the greatest Ponzi game ever contrived". However, such enhanced returns are only sustainable if the working population grows indefinitely. Rather than pay out such enhanced pensions, a better approach is for the state to invest the surplus contributions. This would not only ensure intergenerational

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[7] As quoted in "Snares and Delusions", *The Economist*, 14 February 2002.

equity (as all contributors get the same return) but also the financial sustainability of the system, as the surplus funds would be invested in global capital assets which, according to reasonable expectations, would produce a return from a low risk investment portfolio of the order of wage escalation. These surplus funds could then be drawn upon when future contributors are below the number required to support the retired in a stationary population.[8]

5. Administration

The two contrasting systems – defined contribution arrangements investing in index-linked stock or the sustainable PAYG scheme with an element of pre-funding – might also differ in their administration. The PAYG system would be run by a single entity (the state, as at present, or an organisation the state appoints) while the other is generally envisaged to work in a free but regulated market, with many provident institutions competing for market share. Arguments as to which model is preferable centre on the perceived better service and greater innovation in the competitive market model against the economies of scale a monopoly provider can achieve. The issue of quality of service versus cost of service is a debate that cannot be resolved neatly.

Mahon (2005) gives an overview of the issues, a survey of the literature and a case study of economies of scale within Irish occupational pension schemes. He shows that small schemes have costs a multiple of times higher than large schemes per member. Such costs can best be expressed as a 'reduction in yield' (RIY) for our purposes and Mahon (2005) estimates the costs so expressed to vary from over 3 per cent of assets per annum for small schemes to about 0.3 per cent per annum for larger schemes. These costs are very material in the context of investment returns of the same order of magnitude and, with the aid of Figures 1 and 2, we can estimate the impact of such costs on the ultimate pension. Table 2 illustrates the magnitude of the reduction in pension as a function of administration costs pre-retirement and the investment return before administration costs (but after expenses of investment).

Table 2 shows, for instance, that factoring in administration costs of 1 per cent per annum in the accumulation phase, reduces the ultimate pension by between 18 per cent to 21 per cent per annum (as the assumed investment return increases from 0 per cent to 4 per cent per annum). In fact, it is clear from Table 2 that the reduction in pension is highly sensitive to the assumed administration costs but the reduction is not particularly sensitive to the investment return assumed. A rule-of-thumb can summarise the import of Table 2: *extra administration costs of 0.5 per cent per annum in*

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[8] Of course, the state might adopt a more aggressive investment strategy, as currently pursued by the National Pension Reserve Fund. The essential point, though, is that the state guarantees returns to contributors and charges for those guarantees at a rate consistent with long-term market rates.

the accumulation phase will reduce the ultimate pension by about 10 per cent per annum.

Table 2: Percentage Reduction of Ultimate Pension Due to Impact of Administration Costs in the Accumulation Phase (expressed as reduction in yield), as a Function of the Investment Return above Wage Escalation in the Accumulation Phase

| Administration Costs (RIY) | Investment Return above Wage Escalation in Accumulation Phase | | | | |
| | (before administration costs) | | | | |
%	0%	1%	2%	3%	4%
2.00	31	33	34	36	37
1.75	28	30	31	32	33
1.50	25	26	27	29	30
1.25	21	23	24	25	25
1.00	18	19	19	20	21
0.75	14	14	15	16	16
0.50	9	10	10	11	11
0.25	5	5	5	6	6
0.00	0	0	0	0	0

Assumptions: Pension is payable for 20 years from age 65 years, increasing in line with wage increases. Net investment return in retirement (decumulation phase) is 0 per cent above wage escalation. Once off administration charge of 3 per cent of assets on retirement. Accumulation period 40 years to age 65 years.

Turner (2004, Appendix C) includes a discussion of the costs of different administration structures and puts explicit administration costs at 0.3 per cent of assets for occupational schemes and 0.8 per cent for personal pensions. The administration costs assumed by Turner (2004) are probably below what an Irish pension saver would have to pay. The Pensions Board (2005, pp. 226-7) estimates that administration costs on personal accounts to be of the order of 1.3 per cent to 1.5 per cent per annum pre-retirement and, on retirement, a once-off charge of 3 per cent of assets is assumed.

The conclusion is that economies of scale are material in pension provision. According to estimates in the Pensions Board (2005) report, extra charges associated with maintaining individual retirement accounts are of the order of 1 per cent to 1.2 per cent per annum (that is 1.3 per cent-1.5 per cent less the 0.3 per cent RIY of a monopoly provider). Assuming extra charges of 1 per cent per annum, the associated reduction in pension is of the order of 20 per cent. Murthi *et al.* (1999) gives empirical support to this assessment, estimating that pensions are reduced by one-quarter due to costs associated with operating individual retirement accounts in the UK (both investment and administration).

The above estimates assume that there is no change in the pension provider over the entire accumulation phase of four decades. If pension providers are changed then costs increase further. Murthi *et al.* (1999) reports that the costs of switching from one provider of individual retirement accounts to another (or ceasing contributions with one and starting with another) will reduce the ultimate pension by approximately a further 15 per cent.

Extra charges of this magnitude inhibit movement between providers, so reducing competition in the market.

We conclude that extra charges associated with individual retirement accounts will reduce the ultimate pension by about one-fifth. Since, from our earlier discussion, the pension contracts types are standard, offering guaranteed proceeds, it is difficult to envisage how service can justify the significant financial impact of the loss of economies of scale identified above.

6. Key Principle of Design

There are details to be worked out in the operations of the envisaged PAYG system, stabilised by pre-funding. Yet the principle underpinning the system design is value-for-money for contributors – that is, contributors get a return on their contributions equivalent to the market return on low risk investments. Details that require consideration include formalising the social contract so that it becomes more akin to a financial contract. This entails ensuring that contributions will remain a fixed percentage of wages and that contributions give an enforceable entitlement to a corresponding pension, the pension to increase in line with the weighted average wage growth in the economy. It is necessary to specify how the system will be modified if life expectancies change (see, for instance, Turner (2006) for some interesting suggestions) and specify how the system will treat persons who help achieve 'the common good' but are not in paid employment. The greatest challenge is, though, how to invest such commitments by the state with credibility. As envisaged above, the system is sustainable and self-financing so there is no reason why an organisation at arms-length from the state cannot operate the system. This would entail removing political discretion from state pensions, a particular challenge given its historic importance to Irish politics (see Ó Gráda, 2002).

7. Sustainability in the Very Long Term

Whether based on financial or social contracts, it is necessary that there is a sufficiently large working population to support the rest of the population under any pension system. The projections of the Central Statistics Office, CSO (2004), which were used in the costings of alternative pension systems, assumes that fertility rates in Ireland will fall below replacement rate to between 1.7 and 2.0 over the foreseeable future, with a medium assumption of 1.85. Unless immigration is maintained at a high level, this projection puts pressure on the sustainability of any pension system in the very long term.

Fertility rates below the replacement level of approximately 2.1 are commonplace not only in developed economies but also in more developing ones, as highlighted in Figure 3. In particular the fertility rates of EU-15 countries are amongst the lowest in the world and the new accession countries have even lower fertility rates (e.g., Poland and Slovenia at 1.25). In most regions of the world, as the map makes clear, the population is not replacing itself.

Figure 3: Map of Estimates of Total Fertility Rates, 2006
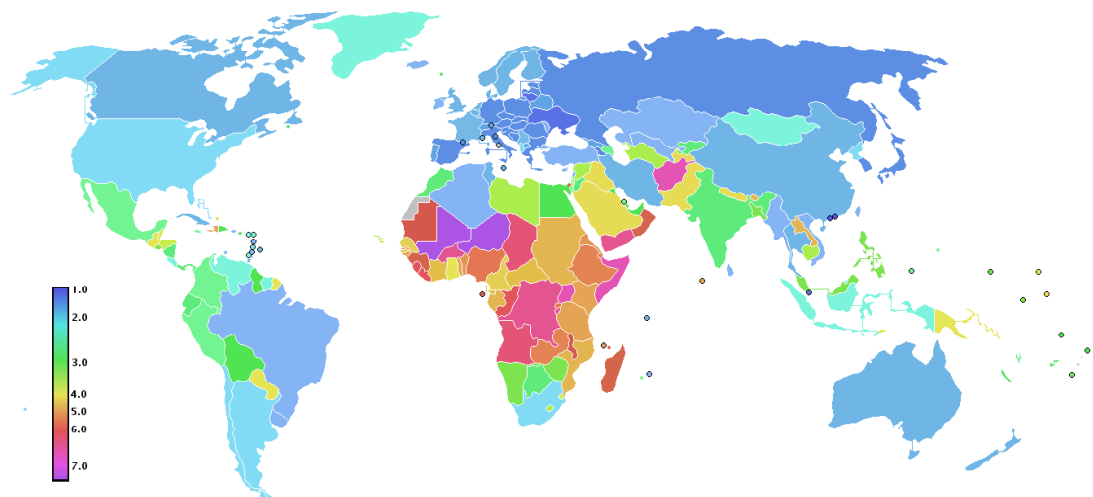
Sources: The World Factbook 2006, Central Intelligence Agency. Map sourced from Wikipedia under GNU Free Documentation License.

The low fertility rates across the world have a direct impact on Ireland. First, it can be anticipated that there will be downward pressure on the future returns from capital markets caused by weaker demand from the smaller future working (and saving) generations. The size of the impact is less easy to forecast but modelling done by, *inter alia*, Miles (1999; Brooks (2000); Turner (2003); and Miles and Černý (2006) are suggestive that a fall in the long-term return of ½ per cent per annum can be expected. This shades downwards the estimates based on long run historic statistics. Second, fertility and migration policy are intimately linked to pensions policy in the long term. In particular, the state might encourage higher fertility. One policy option, compatible with the PAYG system, is to give an increment of pension for each child reared.[9] Equally, pension policy might encompass policies aimed at making Ireland more attractive to immigrant workers than other competing economies. To encourage immigration further might require some radical initiatives and, in the fullness of time, require a rebalancing in the relative taxation of capital and labour when labour replaces capital as the scarce and mobile factor of production. These considerations are obviously longer term (longer than the 50 year projections in the Pensions Board (2005, 2006)) reports but must be borne in mind and inform pension policy.

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[9] Such a policy also helps ensure that parents' limited resources are directly invested in the development of the next generation, and not otherwise directed to pension saving.

8. Conclusion

This paper attempts to identify some principles that might help guide the design and financing of pension provision in Ireland for the twenty-first century. We focus on the key difference between the two design templates of defined benefit and defined contribution, namely, who bears the investment risk. The price of investment risk is assessed on a market-consistent basis and its order of magnitude shown to be material.

It is argued that individual pension savers of modest means or those mandated to save must be considered risk-averse. A proposal is made that the state issue market instruments, at market price, to help these savers manage investment risk. This is represented as a costless innovation that significantly furthers the overall aims of national pension policy. For mandated pension savings designed to provide a minimum pension, investment in low risk instruments should be compulsory. The identification of state guaranteed index-linked bonds of suitable duration as the low investments allows us to identify a more efficient method of providing minimum pensions than through personal retirement accounts.

A sustainable PAYG system is contrasted with compulsory pension savings in low risk investments. Ignoring administration costs, the two systems are seen to be very similar and deliver very similar value-for-money for contributors. The PAYG system was seen to have some second-order advantages. Factoring in administration costs tilts the balance in favour of the PAYG system as it can deliver better value for money through economies of scale.

Of course, the framework for compulsory pension provision in Ireland has been a PAYG system for almost a hundred years. This system needs to be refined in two ways. First, it requires an element of pre-funding to ensure that it is sustainable in the long term. Second, the social contract it represents needs to be better defined so it more closely approximates a financial contract with, in particular, greater clarity on the rights of contributors and beneficiaries.

In conclusion, the argument developed in the paper is against the introduction of special retirement savings accounts suggested in Pensions Board (2006) report. Figures presented show that, for the same level of contributions, such accounts will lead to pensions lower by at least 10 per cent, and probably closer to 20 per cent, than those delivered by the alternative sustainable PAYG system proposed.

APPENDIX I: ESTIMATING THE REAL LONG-TERM RATE OF RETURN ON RISKY ASSETS

A.I Introduction

Risky investments, by definition, deliver uncertain payoffs. Yet for several important purposes it is necessary to have an estimate, with some appreciation for its accuracy, of the long-term average payoff from a diversified portfolio of risky assets. Such purposes include (a) informing the individual's decision on whether to consume or save, (b) estimating the amount to save for a given targeted sum or pension and (c) evaluating the opportunity costs incurred by following a less risky or matching strategy. Estimating the magnitude of the return from a diversified portfolio of risky assets is thus a fundamental problem in an economy. In turn, the risk premium demanded by investors from time to time gives valuable information on the outlook for the economy.

If the portfolio of risky assets is limited to include only equities listed on recognised exchanges we find a considerable literature devoted to the problem. The term 'equity risk premium' (ERP) has been coined to denote the expected additional return from a diversified portfolio of equities over a riskless investment. The riskless investment has been variously taken to be cash instruments, such as short-term Treasury bills or, to provide a better match for the term of the equity investment, returns on gilt-edged stock of long maturity.

Welch (2000, 2001), amongst others, shows that estimates of the future long-term equity risk premium tend to be anchored in the long term *ex post* ERP, despite arguments that the historic ERP appears too high to be considered solely as a premium for risk-taking (Mehra and Prescott, 1985). Knowledge of the historic ERP recorded in different economies, with different growth trajectories, can give valuable insights into estimating the future ERP.

Capital markets in the modern form are relatively recent innovations. Homer and Sylla (1996) give a comprehensive overview of the historical evolution of interest rates, tracing them back five millennia and documenting their level through every major economy in modern times. Homer and Sylla (1996) and Homer (1997) make a persuasive case that modern long and short-term interest rate markets can be traced no further back than Holland of the seventeenth century and England from the eighteenth century. The Dutch developed the notion of a national debt, funded from the taxation revenues of a stable and dependable system of government. The Dutch system of finance migrated to England with King William of Orange, and from England was spread to Ireland, America, and elsewhere. Accordingly, we can date the beginning of modern fixed interest markets from about 1700.

The history of long-term interest rates in modern times is summarised in Figure I.1, which traces long-term interest rates of almost the entire western world every year from 1700, with particular emphasis on those currencies to which Ireland's is or has been pegged. Specifically, the graph shows sovereign long bond yields from 1700 in the UK, from 1746 in France, from 1798 in the US, from (what was to become) Germany since 1815, and from Italy since 1861.

**Figure I.1: Annual Long Bond Yields, 1700-2002**
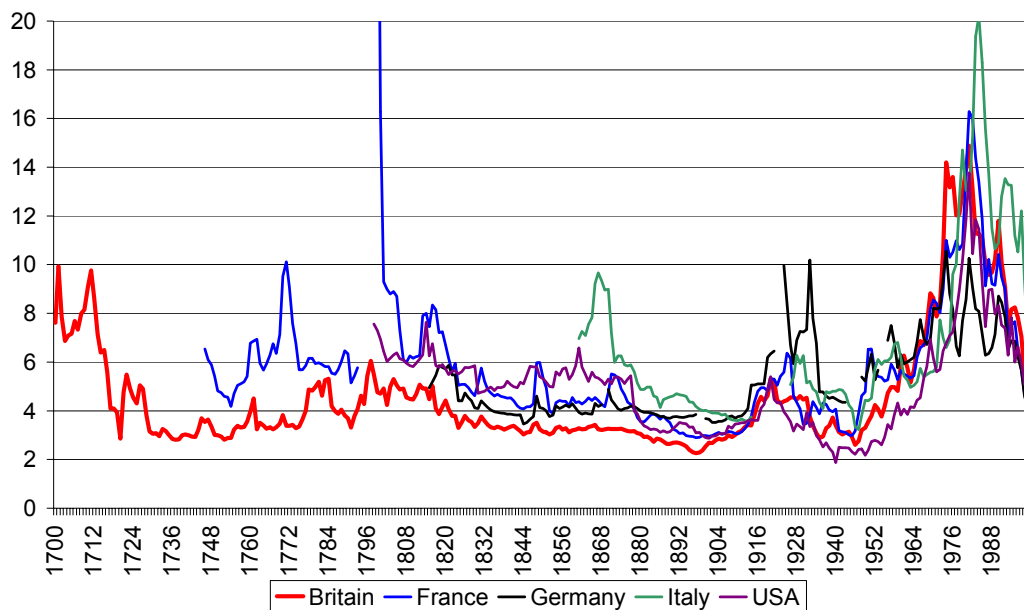
Sources of Data: A History of Interest Rates, Homer, S. & R. Sylla, Rutgers University Press, 1996; *Sylla, R.* website*; Global Financial Data* website; *British Historical Statistics*, Mitchell, B.R., Cambridge University Press, 1988. Note that the real return on gilts over the entire period since 1700 was 3.1 per cent in the UK and 3.4 per cent in US (*Source: Global Financial Data*).

Modern equity markets have an even shorter history. Scott (1912) details the establishment and development of the first limited liability companies in these isles, but the development of extensive markets in such shares was disrupted by the Bubble Act of 1720, which required an Act of Parliament to confer limited liability. While the Bubble Act did not apply in Ireland, it did hamper developments. It was not until legislative developments in the middle of the nineteenth century (particularly the Joint Stock Companies Act of 1856) that limited liability became more widely availed of in the UK (including Ireland). Thomas (1986, p.144) recounts that, outside of the banking sector, there was just 47 companies in Ireland with limited liability in September 1944 (of which 10 were listed on Irish stock exchanges) and this number was swelled by more than 2,500 incorporations over the second half of the nineteenth century.

A.III Investment Returns

The documented history of returns from equity markets prior to the twentieth, including the Irish markets, is as yet patchy (but for the markets in these isles, see Gayer *et al.* (1940), Grossman (2002) and the on-going project of Charles Hickson and John Turner of Queen's University, Belfast). However, the returns from 1900 are now well documented. The real returns in each calendar year from each major market in Ireland from 1900 are summarised in graphical form in Figure I.2.

Figure I.2: Annual Real Returns from Irish Equity, Bond, and Cash Markets, 1900-2002
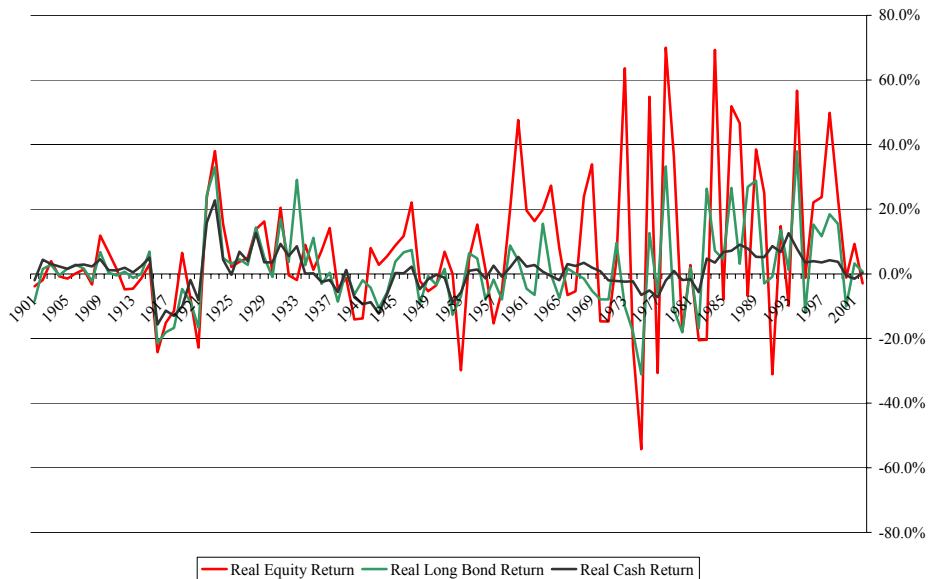
Sources: See Whelan (2004). This source also gives details of returns above wage escalation in Ireland.

The return from each market over the 101 years to end 2000 is summarised below and compared with the returns from other national markets.

Table I.1: Annualised Real Returns on Ireland and Major Markets, 101 Years Ending 31 December 2000

Country	Equity % p.a.	Bonds % p.a.	Cash % p.a.	Inflation % p.a.
Ireland	4.7	1.0	0.7	4.5
UK	5.8	1.3	1.0	4.1
US	6.7	1.6	0.9	3.2
Japan	4.5	-1.6	-2.0	7.6
Netherlands	5.8	1.1	0.7	3.0
Germany	3.6	-2.2	-0.6	5.1
France	3.8	-1.0	-3.3	7.9
Italy	2.7	-2.2	-4.1	9.1
Spain	3.6	1.2	0.4	6.1

Sources: For Ireland see Whelan (2004), otherwise figures taken from Tables 4-1 and 5-1 in Dimson *et al.* (2002). Figures for Germany exclude the two-year hyperinflationary period of 1922-23. If this episode was included then German inflation would go up to an annualised rate of about 34 per cent, cash returns fall to –19 per cent real per annum bond returns to –8.5 per cent, and equities to 4.5 per cent real per annum (Dimson *et al.,* 2000).

The returns from the Irish capital markets mirror that from other national markets. Inflation was roughly in line with international averages; equities considerably outperformed the two other asset classes and by roughly the same margin; bonds and cash struggled to keep ahead of inflation and posted similar modest real returns.

A.IV Investment Risk

Investment risk is often measured as simply the standard deviation of the nominal or real return. Taken as the standard deviation of real returns, such a measure would put the investment risk of the Irish equity, long bond and cash markets at about 25 per cent, 12.5 per cent, and 5 per cent respectively (see Whelan, 2002). However, these popular risk measures are not appropriate to the pension saver whose risk relates to the uncertainty of the future pension, not to the uncertainty of the current value of the sums saved. Defining risk in terms of the targeted pension produces materially different, and generally higher, measures of investment risk. Whelan (2004) provides a detailed analysis and measurement of investment risk by assessing the variability of the ultimate pension under different investment strategies. The measure depends on, *inter alia*, the age of the pension saver. However, over a wide range of ages, the investment risk under this more appropriate definition is of a higher order of magnitude than the conventional measure and bears out our intuition in ranking cash as the highest risk for those targeting a predefined pension, followed by conventional bonds and equities. In particular, duration mismatch in bonds is shown to be of equal or sometimes even greater significance than equity risk. Finally, it is shown that index-linked bonds of suitable duration are the lowest risk investment for an index-linked pension.

The relatively paucity of data from the capital markets' short history give little support to the often expressed view that

investment risk from equities reduces as the time period of investment increases (the so-called 'time diversification of risk'). In any event, such an effect, if present, is not so sufficiently pronounced as to be relied upon by risk averse pension savers. Examples may be cited of long periods where the cumulative real returns from equities were negative, such as the world equity market in the first two decades of the twentieth century, such as the French and German equity markets over a period of more than 50 years (1900-1952 and 1900-1954 respectively), or such as the cumulative decline of 41 per cent in real terms of the Japanese equity market over the 1990s (see Dimson, Marsh *et al.* (2006), especially p.31).

A.V Estimating the Equity Risk Premium

The obvious approach to estimating the future equity risk premium (ERP) is to measure it historically and use this as a best estimate. Derrig and Orr (2004) provide a detailed overview of methods used to forecast the ERP in the much-studied US market. Many of the methods used simple averages or, more generally, assume that the returns are generated from a stationary stochastic process. But the empirical studies surveyed in Whelan (2005b) demonstrate that this assumption is not valid. In short, the risk of risky assets tends to change over time and thus the ERP, as a compensation for risk borne, can be expected to vary with time. Figure I.2 highlights the non-stationary of the returns delivered by the Irish equity market over the twentieth century. Accordingly, forecasting the equity risk premium must be done in tandem with forecasting the expected course of the riskiness of the market. This compounds the problem as we are uncertain of the future riskiness of risky assets.

Mehra and Prescott (1985) argue that the historical equity risk premium appears too large to be attributed solely as a premium for risk bearing, as such an attribution leads to risk aversion parameters that appear implausibly high. Other factors, such as borrowing constraints after the Second World War and the form of taxation, have been used to account for some of the observed excess return (McGrattan and Prescott, 2001). In so far as these latter factors are unlikely to operate to the same extent in the future then the ERP, as a pure premium for risk-bearing, must be lower than it has been observed in the past.

Welch (2000) surveyed 226 academic financial economists between late 1997 and early 1999 and reports that estimates of the ERP (30-year arithmetic average relative to either 30-year bonds or short-term bills[10]) varied between 1.5 per cent and 15 per cent, with a mean of 7.1 per cent, and a median of 7.0 per cent. Of special interest is the subgroup of 17 academics that published at least one paper on the equity risk premium or aggregate stock returns. These

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[10] This pools the results of two different surveys of nearly equal numbers. The first asked the ERP relative to the 30-year bond and the second asked the ERP relative to short-term bills. Coincidently, the average of the responses was almost the same for both groups.

experts estimate the 30-year ERP somewhat lower, the average of this subgroup being 6.5 per cent.

The respondents were mostly US based and it appears that they anchored their estimate about the historical averages based on the well documented experience of the US equity market in the period 1926 to mid-1990s. Indeed, Welch provides evidence that the financial economists believed the consensus of other financial economists' would be somewhat higher than their own (by about 0.5 per cent) and that they appear to shade lower their estimate relative to their perceived consensus view. Welch (2001) updated the survey and reports that the same ERP estimate has now fallen to about 5 per cent to 5.5 per cent, even when the results were limited to that subset of the whole 510 respondents who had participated in the original survey. To summarise it appears that estimates of the long-term ERP are (a) anchored in long term historical averages, (b) shaded downwards slightly, and (c) the estimates are surprisingly sensitive to short-term returns on the market.

Other authors, such as Shiller (2000, 2002); Thaler (2002); Barberis and Thaler (2003) challenge the assumption that investors behave rationally and attempt to account for the equity risk premium (and other apparent anomalies in markets) in terms of cultural, psychological, or structural factors. Thaler (2002), for instance, argues that investors suffer from 'myopic loss aversion', where they tend to be overly influenced by their recent market experiences and, in particular, place too great an emphasis on short-term losses.[11]

A.VI Conclusion

There is an unhelpfully wide range of estimates for the ERP, even amongst academics publishing in the field. All the methods, whether by a formal statistical projection or a less formal adjustment of past returns to exclude episodes unlikely to recur, are anchored to greater or lesser extent on the ERP observed in the past.

Based on our summary of the long-term returns delivered by Irish and international capital markets, it would not be unreasonable to assume the following real (geometric) returns for the long-term future, not allowing for management and other expenses:

Diversified equity portfolio:	3-5%
Index-linked and nominal long bonds:	1-3%
Cash:	½%-1½%

The above estimates are subject to the qualification that the returns from such risky assets will not be as expected. No doubt, this qualification is why the markets so generously reward the risk bearer as, as yet, there is no satisfactory model for investment risk.

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[11] Whatever about investors, Thaler's thesis does account for the financial economists' dramatic revision of the long term ERP between Welch (2000) and Welch (2001).

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ENDNOTE

† In standard actuarial notation, if r is the retirement age and x the age when contributions start then we have,

$$\overline{a}_{\overline{x:r-x|}}^{@i\%} = \frac{\overline{a}_{\overline{x:r-x|}}^{@0\%}}{\dfrac{l_r}{l_x}\,\overline{a}_r^{@0\%}}\left(\frac{l_r}{l_x}\,v_{@i\%}^{r-x}\,\overline{a}_r^{@i\%}\right)$$

Rewriting gives:

$$\frac{\overline{a}_{\overline{x:r-x|}}^{@i\%}}{\overline{a}_{\overline{x:r-x|}}^{@0\%}} = \frac{\overline{a}_r^{@i\%}}{\overline{a}_r^{@0\%}}\,v_{@i\%}^{r-x}$$

Now, as suspected, $i=0$ per cent is clearly a solution. This solution can be seen to be unique for reasonable r by considering the derivative with respect to i of both sides. The import of this is that the internal rate of return to contributors in a stationary and sustainable PAYG system is equal to the weighted average rate of wage growth of contributors.