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Introduction

The search for a sustainable way of providing pensions has become increasingly important. Whilst first world countries are struggling with increasing longevity and low interest rates, developing nations are keen to take advantage of higher returns and better demographics without storing up pension problems for the future. In countries where the state has been a major provider of pensions, the cost of provision has brought a desire for change. Risk is being transferred to individuals, and funded solutions are supplementing pay-as-you-go (PAYG) approaches. Auto-enrolment and the National Employee Savings Trust (NEST) in the UK are just the latest examples of this trend which has already been seen in Australia and New Zealand with Superannuation Funds, Denmark with ATP and elsewhere.

The traditional approach to analysing a country’s pension provision is through the lens of the three (or sometimes four) pillar framework, described in “The Structure of Pension Systems” below. However, such an approach can be unnecessarily restrictive – in reality, the boundaries between these pillars are blurred. The pillar-based approach also fails to address the degree of certainty provided by each component of a pension system, and the pattern of income as a whole. Both of these aspects are important, as the degree of income certainty differs significantly from person to person and from system to system. Furthermore, the lower the level of retirement income, the greater the degree of certainty that is likely to be required from that income.

But certainty is generally expensive. More flexible income needs can allow investment strategies to target higher returns, thus offering the prospect of a higher pension. Those earning anything other than a very basic level of income must be prepared to take on such additional risks.

The level of income is not the only factor. It is also important to recognise that the capacity for certain pension strategies to work develops as people age. The older an individual gets, the more important it becomes to have some sort of certainty around the term for which an income will be received.

So, taking all of this into account, how should pension provision be designed to offer the best compromise between the level and certainty of income? This is the question we seek to answer in this paper.
The economic challenge

When long-term interest rates were high, pension provision was far more straightforward. A long-term income — indeed, an income for life — was cheap to secure, whether it was through the purchase of an annuity or through the income generated by a pooled fund. Companies could also afford to guarantee generous pensions, as high interest rates kept the discounted cost of benefits low.

However, as is widely known, interest rates around the world have fallen significantly in recent years. This is shown in Exhibit 1. There have been a number of reasons for this. Over the last 30 years, short-term interest rates have fallen as price inflation has been brought under control. Long-term interest rates — which at least in part reflect expectations of future short-term interest rates — have followed. More recently, the 2008 liquidity crisis significantly reduced expectations of future growth. Short-term interest rates were cut drastically, and ongoing doubts over future growth have weighed on long-term interest rate expectations. There has also been a flight-to-quality issue, where investors around the world have sought low risk assets. This has driven the price of high-quality government bonds higher and, therefore, lowered the yield. Finally quantitative easing — the purchase of government (and other) bonds by central banks — has lowered yields by design, as part of an attempt to lower the cost of capital for companies\(^1\).

Falling interest rates have a number of impacts on pension schemes. First, they increase the cost of defined benefit (DB) accrual. When someone stays an additional year in a DB pension scheme, the slice of benefit that they earn is equivalent to a deferred annuity. If the interest rate used to price this annuity falls, then the cost of the annuity goes up. In simple terms, a falling yield means that it costs more to secure the same cash income stream. Falling interest rates have thus made DB pensions more expensive.

They have also increased the cost of annuities for defined contribution (DC) retirees. If annuities are compulsory, then falling interest rates have reduced the level of income that a newly-retired pensioner will be able to secure — an annuity is an income stream for life, and if yields fall then the price of that income stream rises. However, even if annuitisation is

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\(^1\) This is discussed in more detail in “Not drowning but waving? Quantitative easing and UK pension schemes”, by Paul Sweeting, Alex Christie and Edward Gladwyn, J.P. Morgan Asset Management.
not compulsory, falling interest rates mean that investors will receive lower levels of income from their bond portfolios.

Back in the DB world, low interest rates also push the value of liabilities up – in other words, they effect the value of benefits already earned as well as those still being accrued. This is not in itself an issue if the value of assets increases by more than the value of liabilities – however, this has not always been the case.

EXHIBIT 2: PERFORMANCE OF VARIOUS UK ASSET CLASSES FROM 31 DECEMBER 1999 TO 30 SEPTEMBER 2013

Source: DataStream, data as of 1 October 2013; J.P. Morgan Asset Management calculations; total return indices used are: FTSE British Government Index Linked Over 5 Years; FTSE British Government Fixed Over 15 Years; iBoxx Sterling Corporate All Maturities; FTSE All Share.

Exhibits 2, 3 and 4 show the total returns from a range of asset classes in the UK, the U.S. and continental Europe. Depending on the valuation approach used, the value liabilities can be thought of as similar to one of the bond indices. Clearly, equities have underperformed bonds significantly over this period. Admittedly, the period chosen is the least flattering for equities. Both UK and U.S. equities outperformed their respective bond indices over the 10 year period to 30 September 2013. UK equities performed the same feat over the five years to 30 September 2013, with UK equities beating long Treasuries and just losing out to long corporates. However, many pension schemes assume that their assets – which tend to include not only bonds but also equities and other return-producing assets – will outperform bonds by 1%, 2% or more per cent each year, essentially capitalising an expected risk premium over bonds. This premium has not been seen in recent years and the result has been pension deficits. In defined benefit pension schemes, the deficit has been the responsibility of the sponsoring employer – and sponsors are increasingly unwilling to shoulder this risk.
The demographic challenge

The economic environment does not provide the only challenge. Not only are assets producing lower returns, but those returns need to pay benefits that are lasting longer.

**EXHIBIT 5: LIFE EXPECTANCY AT BIRTH, 1960-2011**

The fact that longevity is increasing is well understood. As Exhibit 5 shows, life expectancy at birth has been increasing steadily for many years in a wide selection of developed countries. We include a range of “old world” and “new world” countries. China is also shown, as an example of a country that is still developing demographically. Exhibit 6 shows that longevity in China compares well with that in many developed countries, particularly when in 31 countries – all of which are in Africa – the life expectancy in 2011 was below 60 years.

**EXHIBIT 6: 2011 LIFE EXPECTANCY AT BIRTH FOR 197 COUNTRIES**

The improvement in longevity for many countries only tells part of the story. First, life expectancy at birth shows exactly that – the time for which an individual born in that year would be expected to live if mortality rates at each age remained unchanged. This means that it is influenced not only by the length of time that older people survive, but also by factors such as childhood mortality and workplace safety. This is demonstrated clearly in Exhibit 7, which shows the proportion of deaths at each year of age for UK males, and how this has developed over time. Although mortality has been improving since the middle of the nineteenth century, much of the improvement for the first hundred years was in reduced mortality for working-age men. In fact, the modal age of death – shown by the peak of each curve – remained largely unchanged from 1925 to 1975, after which it increased substantially. This is important, because it means that improved longevity in retirement is a relatively recent phenomenon.
These increases in life expectancy have significantly increased the cost of private sector pension provision. As with falling interest rates, increasing longevity has increased the cost of pension accrual and annuity purchase, as well as pushing up pension scheme liabilities. However, unlike low interest rates, longevity improvements are unlikely to reverse in the foreseeable future.

Increased longevity also presents a problem because of its interaction with low interest rates. Both increase the duration of liabilities, making them more sensitive to changes in bond yields. In other words, increasing longevity has not just increased pension scheme costs and liabilities, it has also made them more volatile.

EXHIBIT 7: PROPORTION OF DEATHS AT EACH YEAR OF AGE FROM 10 TO 110, UK MALES, 1850-2010

Source: The Office of National Statistics (statistics.gov.uk), data as of 1 October 2013

But for a pension system as a whole, indeed for the broader economy, life expectancy is only one part of the story. Many pension systems use a PAYG approach, where pensions are met from tax revenues — in effect, the working population pays the pensions of the retired population. This means that an increasing number of pensioners might be only half of the problem, if the number of workers does not increase at a sufficient rate.

And this does not appear to have been happening. In particular, whilst longevity has been increasing, fertility rates — defined as the average number of children born to each woman — have been falling. Exhibit 8 shows the total fertility rate in nine countries, based on the then current age-specific fertility rates. All countries have seen falling fertility rates over the last few decades. For most, rates fell sharply until the 1970s, after which they largely levelled off; in Japan rates started falling later — albeit from a lower base — but continued to fall into the new millennium. Interestingly, Germany reached the same low levels of fertility even earlier. However, the profile of Chinese fertility is the most startling, with the impact of the well-known policies around birth rates being clear to see: following encouragement to limit the number of children per family to two, the one-child policy was introduced in 1979. However, there were so many exceptions, including for families in rural areas with a single female child, for ethnic minorities and for couples where both parties where themselves single children, that by 2007 only 35.9% of families were subject to the rule. The policy was further relaxed in 2013, such that couples where only one party was a single child would be allowed a second child.

EXHIBIT 8: FERTILITY RATES, 1960-2011

Source: The World Bank (databank.worldbank.org), data as of 1 October 2013

An international comparison of fertility rates, given in Exhibit 9, shows a far less predictable outcome. Japan and Germany are clearly at the lower end of the scale, though there are a number of countries with lower rates: Macao, Singapore and Hong Kong have the lowest fertility rates, with a number of eastern European countries not far behind. At the other end of the scale African countries again dominate, though other developing nations such as Afghanistan also feature.

2 “Most People Free to Have More Children”, China Daily, 11 July 2007
Japan’s combination of increasing longevity and falling fertility has proved toxic to the old age dependency ratio, shown in Exhibit 10. This is the ratio of people aged 65 and older to those aged from 16 to 64. In other words, it is the number of pensioners supported by each person of working age. Germany is not far behind, with the prolonged low birth rate having a profound effect. At the other end of the scale, it is clear that China’s low birth rate has not offset its comparatively poor life expectancy — yet. However, as interesting as the demographic extremes of Japan and China is the fact that there appear to be two distinct demographic groups in the developed world. This can be seen more clearly in Exhibit 11.
It is important to note that whilst China does not have a problem with its old age dependency ratio, this could well change. Low birth rates have persisted for some time, and longevity is creeping up. This means that it is important for China — and other countries in a similar position — to ensure that their pension systems are designed in a way that is sustainable. If each generation must pay for the pensions of its parents, grandparents and even great-grandparents, then the consequences for a country’s economy will be profound. It’s better to create a pension system based on pre-funding, but with sufficient flexibility to deal with the inevitable unpredictability of the future.

Source: The World Bank (databank.worldbank.org), data as of 1 October 2013
The structure of pension systems

Before looking at how best to ensure adequate retirement incomes for individuals, it is worth considering how pension systems can be viewed in their totality. This is important, because private pension provision must be considered in the context of any state provision that exists.

The multi-pillar view of pensions

A common way of looking at pension systems is to use the three pillar system, as shown in Exhibit 13. The three pillars are usually defined as:

- compulsory, typically PAYG, state pensions (first pillar)
- supplementary occupational pensions (second pillar)
- individual savings, including personal pensions and life assurance (third pillar).

Some also consider a fourth pillar:

- retirement age flexibility.

The fourth pillar recognises that deferring retirement is a way of making finite retirement resources last longer. In other words, it represents the way in which a pension may be increased by retiring later, or phasing in retirement by treating it as a process rather than an event.

In the multi-pillar structure, there is considerable variation over the nature of the second pillar. Furthermore, the line between the three pillars is somewhat blurred. Consider a state-sponsored, PAYG system funded by contributions calculated as a percentage of salary. Does this belong in the first or second pillar? Similarly, defined contribution arrangements can be thought of as individual savings, but does the presence of employer contributions promote them to the second pillar? This suggests that it is worth considering different criteria.
Degrees of certainty — A different view of pension systems

Another way of thinking about pension provision is that the guarantees surrounding retirement income tend to fall as responsibility moves from the state, through the employer and to the individual. This is desirable, as it also tends to mean that the guarantees fall as projected retirement income rises. However, the way in which it falls differs from country to country, and finding the right level and structure of guarantees has proved difficult.

Historically, employer-sponsored DB pension schemes have been used as the basis for second pillar provision in many countries. These schemes have also typically been both final salary (where the benefit depends only on the salary earned in the last few years of employment) and balance-of-cost (where the employee’s contribution is a fixed proportion of salary). As a result, the level of guarantee has been high and, due to the factors discussed earlier, increasingly expensive.

The response in many countries has been to move from DB to DC. The most common model for DC is for contributions to be paid as a fixed proportion of salary into a range of funds, and the accumulated proceeds to be used to provide a retirement income. This typically means that all risk is shifted from the employer to the employee, significantly reducing the level at which guaranteed income ends.

In the UK and the Netherlands there is an opportunity – essentially an obligation – to gain a guaranteed income at retirement by converting accumulated DC funds into an annuity. The 2001 Riester (DC pension) reforms in Germany and the 2004 TFR (Trattamento di Fine Rapporto related to severance pay) reforms in Italy have created similar but smaller obligations in these two countries, whilst requirements also exist in Switzerland and Chile, as discussed later. The annuities purchased are almost exclusively non-profit or income annuities, which give a guaranteed income for life. Compulsory annuitisation has a number of advantages. First, it avoids adverse selection – that is, only the healthy choosing to buy annuities. To an extent, this advantage has been eroded by the growth of underwritten annuities, which allow those with health problems to buy annuities at a better price. However, other advantages remain. If everyone must buy an annuity, then the resulting scale should lower administration costs. It could also limit moral hazard, inasmuch as forcing people to annuitise stops them from spending their assets too quickly in the knowledge that there is social security to fall back on. Finally, from the government’s point of view, annuitisation ensures that it can essentially levy tax on the pension pot once the annuity payments commence.

Because annuities offer absolute guarantees they are expensive, particularly given current low interest rates. However, annuities provided by insurance companies also include an additional layer of cost in the form of risk capital. When an insurer sells an annuity, it must hold sufficient capital not just to cover the expected annuity payments, but also to cover the payments in the event of higher-than-expected longevity or lower-than-expected returns. If this additional capital is not needed, it goes to the insurer as profit.

Annuities are also unpopular. This has been attributed to these additional capital loadings, the adverse selection mentioned above, and people’s inability to relate the price of an annuity to the likelihood of survival, but mainly the bequest motive: the desire to leave some assets to the next generation. Elsewhere, fewer guarantees are on offer and the norm is for assets simply to be withdrawn from the fund over time.

The funds that are withdrawn are usually subject to tax. This means that deferring pension withdrawal deprives governments of tax revenue. As a result, many countries have age-based minimum withdrawal rates. In the U.S., the accumulated contributions to a 401(k) plan must be withdrawn at a minimum rate from age 70 if a proportion of the fund is not to be forfeit; in Australia, minimum withdrawal rates generally apply from age 65. In neither country is there a maximum distribution rate.

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The risk associated with a withdrawal approach increases exponentially with age. How much money should a 90 year old take from a portfolio each year to ensure that it lasts for the rest of his or her life? One suggested solution to this risk is the advanced life deferred (or delayed) annuity (ALDA)\textsuperscript{14}. This is an annuity purchased at retirement that does not come into payment until some years later. At the moment, ALDAs are even less popular than immediate annuities. Of the USD 8.7 billion of income annuities sold in the U.S. in 2012, only USD 1 billion related to ALDAs. This compares with USD 80 billion of variable annuities sold in the same period\textsuperscript{15}. These numbers sound large. However, when compared with the USD 5.1 trillion in employer-sponsored DC accounts (of which USD 3.6 trillion is in 401(k) accounts) and another USD 5.4 trillion in individual retirement accounts (IRAs)\textsuperscript{16}, the relative unpopularity of annuitisation in the U.S. is clear.

ALDAs should, in theory, be more attractive. Even at the low rates of interest currently in place, the premium for a deferred annuity starting at age 75 is only 60% of the cost of an immediate annuity starting at age 65. Deferring the income to age 85 reduces the premium to around 34% of the immediate premium, and deferring to age 95 results in a premium of only 18% of the immediate premium being due\textsuperscript{17}. If interest rates were not at their current low levels, these ratios would be further reduced.

However a significant proportion of the premium actually payable would cover regulatory capital. Using the same assumptions as above, and assuming the Solvency 2 longevity stress test of a one-off fall in mortality rates of 20% indicates that the capital for longevity risk alone rises from just over 2% of the premium for an immediate annuity to almost 10% for a 30-year deferred annuity. Other capital requirements would be similarly increased by the long duration of the product.

ALDAs also do not typically offer inflation (cost-of-living) protection, not least because such protection is expensive. The market for inflation-linked instruments is relatively small, and inflation-linked products have a naturally longer duration. To summarise, even the guarantees arising from annuitisation make DC plans expensive (or result in low benefits being received). And there has been a recognition for a long time that fully guaranteed defined benefit schemes are unsustainable. However, guarantee-free DC does not on its own offer a suitable alternative. As a result, there is increasing interest in risk-sharing approaches.

The Dutch solution

Standard Dutch DC schemes\textsuperscript{18} have already been discussed briefly above. However, such DC provision is not a common form of pension benefit in the Netherlands. More common are defined benefit and collective defined contribution arrangements.

Risk-sharing defined benefit

In a sense, the existing defined benefit plans in the Netherlands already share risk. This is despite the fact that at first sight, the financial assessment framework currently in force (Financiele Toetsingskader or FTK) places tight restrictions on the funding of Dutch defined benefit pension plans. Liabilities are discounted using the swap curve, and assets worth at least 105% of these assets must be held. Additional funding is required to cover risks such as asset-liability mismatch. There has been some leeway given, in that an “ultimate forward rate” is used to give higher discount rates for longer terms, thus reducing the liabilities. However, the real risk sharing starts with the treatment of inflation-linked increases.

As mentioned above, the absolute minimum ratio of assets to liabilities is 105%. However, this assumes that the assets and liabilities are as closely matched as possible. To the extent that risk arises from the interest rates, investment in non-matching assets (such as equities) or some other source, a higher ratio of assets to liabilities will be required by the regulator.

If the funding level — the ratio of assets to liabilities — is less than the required amount, then not only is there a recovery plan, but there is an absence of inflation protection for pension payments; inflation protection is given only for funds with spare funds under this definition.

There is also risk sharing on the downside. If a sponsor falls behind on a recovery plan and the pension plan is seriously underfunded, then payments to pensioners can actually be cut.

\begin{thebibliography}{9}
\bibitem{paracer2013} M. Paracer (July 2013), “Income Annuities are Getting a Second Look”. InsuranceNewsNet Magazine.
\bibitem{jpmorganassetmanagement2013} J.P. Morgan Asset Management calculations, based on UK Government bond yields as at 30 August 2013 (source: Bank of England) and 2010-based UK mortality projections (source: Office for National Statistics).\end{thebibliography}
Finally, the nature of the defined benefit promise is itself risk sharing, in that most schemes are now career average rather than final salary schemes. This means that rather than the pension being based only on the salary at retirement, it is based on the average salary over the employee’s time in the scheme.

However, the Dutch central bank (De Nederlandsche Bank, or DNB) — which regulates Dutch pension schemes — is proposing more radical risk sharing with “FTK II”. Initially there were proposals for two frameworks to co-exist. The first would have used a real rather than a nominal rate to discount liabilities — thus building in inflation protection — but with an additional risk premium in the yield of up to 150 basis points. The additional buffer for mismatching and other risks would have been limited to 1% and, crucially, any underfunding would be spread over a period of three-to-ten and passed onto members in the form of negative indexation. There would also be mandatory longevity adjustments spread over the same period.

This deal was designated the “real contract”. There was also to have been a “nominal contract” to provide a legacy solution for plans wishing to continue under the current regime; however, the current thinking\(^ {19}\) is that some composite of the real and nominal contracts will be used.

It is far from certain that this legislation will be passed. However, the proposals give an interesting view of how risk can be shared by reducing the guarantees provided by defined benefit schemes.

**Collective defined contribution (CDC)**

Dutch regulations also allow for a form of CDC scheme, which also shares risk. CDC schemes in the Netherlands essentially operate like DB schemes without a sponsoring employer. Like a DB scheme, the pension payable is based on a combination of salary and service. However, the contributions are fixed for long periods. If the accumulated contributions are not sufficient to meet the DB promise, then benefits are reduced.

Unlike most DC arrangements, the annuities are paid from the fund itself rather than from an insurance company — the collective nature of the arrangement applies to the decumulation as much as the accumulation.

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\(^{19}\) As at 10 October 2013.

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**The Danish solution**

The Danish\(^ {20,21}\) three tier system has a clear division in its second tier between a countrywide DC arrangement, and industry-wide DC provision. Both are discussed below.

**ATP**

The ATP (Arbejdsmarkedets Tillægspension) is the mandatory, supplementary earnings-related plan in Denmark. It sits at the lower end of the second pillar, as there are also quasi-mandatory defined contribution schemes on top of the ATP.

Everyone working for at least nine hours a week must pay 90 Danish krone (around USD 15) per month into the ATP. This amount is supplemented by an employer contribution of 180 Danish krone (around USD 30), giving a total of 270 Danish krone (around USD 45) a month\(^ {22}\). These contributions equate to around 1% of earnings in aggregate — the ATP is intended to provide a safety net that sits above social security. As can be seen above, one-third of contributions are paid by employees, whilst two-thirds are paid by employers.

Out of each contribution to the ATP, 80% is used to purchase “slices” of deferred annuity. The level of deferred annuity is determined by the swap yield at the start of the year. As a result, the guarantees implicit in these annuities are largely hedged.

The remaining 20% of each contribution is invested more aggressively. The returns are intended to fund inflation protection for pensioners in the form of discretionary increases to both deferred annuities and annuities in payment. Annuities are paid direct from the ATP rather than being secured with insurance companies, although ATP does calculate its reserves using Solvency II, the forthcoming Europe-wide insurance regulatory framework.

**Supplementary DC**

ATP is supplemented by “quasi-mandatory” occupational DC schemes. These are theoretically voluntary, but for employees of companies bound by industry-wide collective bargaining agreements they are essentially mandatory. The average contributions to these schemes are 9% for blue collar workers and, 15% for white collar.

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\(^{21}\) www.atp.dk

\(^{22}\) As at 10 October 2013
Historically, these schemes have offered guaranteed rates of return in the accumulation phase. However, falling interest rates have pushed an increasing number of schemes to revert to returns linked solely to the underlying investments, not least because the investments in schemes offering guarantees more or less guarantee a low rate of return for scheme members.

The Swiss solution

Switzerland also operates a notionally two-tiered second pillar, inasmuch as there is a minimum value of benefit that must be provided by schemes, and any “over-obligatory” provision above this is regarded as “pillar 2b”.

The system on which it builds — “pillar 2a” — is essentially a cash balance arrangement. It is governed by the BVG (Berufliches Vorsorgegesetz) or LPP (Loi sur la Prévoyance Professionnelle), which can be translated as the “professional foresight law”. Anyone earning over approximately USD 25,000 must pay a proportion of their earnings from this level up to four times this amount, around USD 100,000. The contribution rate is normally age-related, running from 7% up to 18% from age 55. At least half of this contribution must be paid by the employer.

The minimum rate of return credited to the contributions each year is set by the Swiss Federal Council. This rate has been falling steadily, and stands at 1.5% for 2013. There is also a statutory annuity conversion rate for pillar 2a.

Interestingly, whilst annuitisation is often optional (one-quarter of an individual’s fund may always be taken as a lump sum, with more being available depending on the rules for each particular plan; the rules around over-obligatory contributions tend to be even less strict), more than half of Swiss retirees choose annuitise fully at retirement, despite the fact that the lump sum alternative is subject to a lower rate of taxation.

There are a number of possible reasons for this unusual willingness to annuitise. One reason is that the conversion rate is generous, certainly when compared to the annuity that would be available from an insurance company with the same value of assets. The fact that only a minority of Swiss citizens own their homes outright is also an issue, with the stable income available from an annuity providing a good match for rental or mortgage payments. Swiss annuities must also provide a pension for spouses and children, meaning that the “bequest motive”, often given as a reason for the unpopularity of annuities, is at least partially dealt with. However, one of the key reasons is probably that annuitisation requires an individual to do so little. The annuity is paid from the fund rather than by an insurance company. As such, it does not require the transfer of a large volume of assets; rather, it can be converted whilst remaining in the custody of a (presumably) trusted provider.

Because they are annuitising cash balance arrangements, Swiss plans leave employers with a significant level of investment and longevity risk. The Swiss system is also a fragmented one, with a large number of institutions that vary significantly in size. However, there are aspects of the system that are attractive.

The Chilean solution

Chile’s pension system has long been held out as providing a good model for other countries. Though it has changed a number of times over the years, the current system has its roots in pension reforms that took place in 1980. It was then that the PAYG system was replaced with a funded alternative. The most recent reforms took place in 2008, which sought to increase coverage, in particular pulling the self-employed into the system.

The basis of the Chilean system is a small number of privately run DC funds, the AFPs (Administradoras de Fondos de Pensiones). These funds must provide minimum returns relative to the industry average. Whilst this is intended to ensure that the choice of fund does not jeopardise retirement prospects, it does risk encouraging herd behaviour in terms of asset allocation.

At retirement, individuals have a choice. If the resulting income will be greater than a guaranteed minimum level, then an immediate annuity can be bought from an insurance company. There is also the option to buy an ALDA from an insurance company, and to draw down the rest of the assets in the period before the deferred annuity comes into payment. Finally, an income may be drawn down from the AFP. The level of income is determined using actuarial factors but it must, again, be above the guaranteed minimum. If assets are exhausted, the AFP takes over payment of the minimum pension.

24 Winterthur (January 2013), “All you need to know about Pillar 2: mandatory occupational benefits (BVG) in Switzerland”
25 www.bsv.admin.ch
Whilst it has sought to remove the pensions problem from the government’s balance sheet, the Chilean system does have challenges. First, the government continues to convert its existing PAYG liabilities into funded equivalents, which is adding financial stresses to the system. Administration costs are high, despite the relatively small number of providers. The fact that the system doubles as a provider of social security, making additional payments to those who have not managed to build up an adequate pension, clouds the market-related intentions of the AFPs. Finally, the insurance-driven annuity provision means that money is spent on capital requirements as well as retirement provision. However, the range of options – in particular, the combination of ALDA and drawdown – offers some interesting ideas.

Comparison between the Dutch, Danish, Swiss and Chilean systems

Both the Dutch and the Danish systems benefit from scale. In the Netherlands, schemes are industry-wide, whilst the ATP covers all Danish employees. However, they approach risk sharing in different ways. The Dutch system tries to target a pension with the aim of inflation-protecting it, but with the possibility of cuts in extreme situations; falling pensions are more likely in Dutch CDC arrangements, and could also be seen more frequently if FTK II comes into force. Whilst scale exists in Chile, it seems to confer little in the way of advantage.

The Danish ATP has a much lower likelihood of pension cuts, but the guarantees are set at a much lower level. Furthermore, the inflationary increases are aspirational and determined by the return on the non-matching assets. The fact that excess returns are ultimately converted to further slices of current and deferred annuity also means that returns are held back until further incomes can be guaranteed, rather than paid out with the possibility of a subsequent cut. This is entirely appropriate for an arrangement such as the ATP: it provides a very basic level of benefits, and a cut in these benefits could have serious consequences for recipients.

The same is true of the Swiss system. Whilst the level of benefits is less certain, with the conversion rate being unknown before retirement, it is guaranteed and inflation-linked once it begins to make payments. It also seems that the payment of benefits by the same institution that looks after the fund in the accumulation phase encourages individuals to choose annuities rather than the lump sum alternatives.

Whilst the Swiss system does not have the advantage of scale by design, it does have the advantage that pillars 2a and 2b can be combined in the same investment vehicle – both the obligatory and over-obligatory benefits are paid from the same pool of assets.

The main attraction of the Chilean system is the option to withdraw assets in combination with an ALDA. However, the restrictions around the pattern of withdrawals, the limited investment choices and the high costs, combined with the mixed status of the system as a provider of both funded pensions and social security means that it is of limited relevance otherwise.

Defined Ambition – the UK Consultation

In November 2012, the Department for Work and Pensions (DWP) in the UK issued a white paper entitled “Reinvigorating Workplace Pensions”. This set out the Government’s broad strategy for pensions and proposed a number of “reinvigoration objectives”, such as increasing the amount saved and increasing transparency. It also touched on the concept of defined ambition (DA), which encompassed a range of options that fell somewhere between DB and DC arrangements. The purpose of DA was to reduce or remove the burden of DB pension schemes from sponsoring employers, whilst allowing risk to be shared to a greater extent than was the case with most traditional DC arrangements. Following the 2012 paper, an industry working group was set up to look at the range of DA options available, resulting in a consultation document that was issued in November 2013. This considers two flavours of DA: DA from DB, and DA from DC.

DA from DB

DA from DB describes the potential movement from the guarantee-laden system of DB pensions in the UK to something less onerous. Applying to future benefits only, it would involve the removal of compulsory indexation, with even inflation-related increases being subject to removal in the event of a scheme being underfunded. As such, it has similarities with the proposals for FTK II in the Netherlands.

There is also a proposal to use life expectancy adjustment factors. These would allow the retirement age for accrued benefits to be increased if longevity improvements were greater than anticipated.

27 “Reinvigorating workplace pensions”, Department for Work and Pensions, November 2012
DA from DC

DA from DC describes some ideas for providing increased certainty for DC members without requiring employers to take on balance sheet risk. Four options are considered:

• a money back guarantee on contributions;
• capital and investment return guarantees;
• retirement income insurance; and
• a retirement income builder.

The final option is in fact described as being similar to Denmark’s ATP scheme, so needs no further explanation. However, it is worth noting that it provides a relative degree of certainty with the prospect of some upside; in contrast, the remaining three options provide explicit downside protection. The first three proposals can also be thought of as offering protection at different points in an individual’s life cycle.

The money back guarantee would ensure that the fund at retirement would be at least equal to the contributions paid in. Such a guarantee would be less expensive the longer the term, but it is nonetheless a guarantee and as such has a cost. It also protects only the value of the contributions and says nothing about the income that these contributions would produce. However, it could encourage younger investors to take a degree of investment risk consistent with their investment horizon, rather than investing in “safer” cash-type investments. It could also be useful if it encouraged people to contribute to pensions in the first place — or discouraged them from opting out in the light of poor performance. This is an important way in which guarantees can add value: from the point of view of a pension system, it is better to have a large proportion of the population investing in a way that might be sub-optimal than it is to have a small proportion investing optimally whilst the majority make no provision for retirement. This is particularly important for people who are just starting to make contributions — the larger the accumulated fund is relative to ongoing contributions, the more likely an individual is to continue to save.

It is at this point that capital and investment guarantees are intended to kick in. Their proposed use is to give certainty over the accumulated value of the fund, possibly with a guaranteed rate of return. It is also intended that they operate with a lock in period, to facilitate investment in illiquid assets. Whilst such guarantees might encourage more appropriate levels of investment risk to be taken, the guarantee is still in relation to the value of the fund not the level of income ultimately produced. As such, its usefulness might be limited.

The final guarantee is a proposal for retirement income insurance. This would use a proportion of the pre-retirement contributions to provide protection on the level of income received. A pension would be drawn down from the retirement fund, with a guarantee that an insurance policy would continue payments if the fund were exhausted. This is in effect a variable annuity rider. For individuals they can be costly, and for insurance companies they can be difficult to hedge.
A plan for defined contribution

Considering the systems and proposals above suggests a number of factors that could be combined for a defined contribution system.

The basic level

The most important aspect of this level of benefits is downside protection. However, this does not mean downside protection in terms of asset values; rather, it means certainty over the level of income received.

As such, the ATP provides a good model. This approach is also similar to the Pension Income Builder option proposed in a recent UK consultation from the Department of Work and Pensions (DWP). In particular, the structure could be as such:

- Contributions paid as a fixed percentage of capped earnings
- 80% of these being paid to the matching fund, to provide fixed, collective deferred annuities (CDAs)...
- ...which are payable from retirement (collective current annuities, or CCAs)
- The matching fund invests in assets whose cash flows best match the annuity payments
- 20% of the contributions are paid to the growth fund...
- ...which is used to fund increases in the CDAs and CCAs...
- ...but may also be used to cover increases in longevity, which would otherwise result in the assets of the matching fund being insufficient
- The payments from the matching fund are not guaranteed, but the growth fund would need to be completely exhausted before benefits were cut
- Actuarial adjustment factors could be used to increase the retirement age if longevity increased to the extent that the growth fund was used more to deal with increased life expectancy than increases to the benefits in the period of deferment...
- ...but the choice of whether to defer — and thus to gain a higher income — would be down to each individual

Such a structure would work best in a multi-employer environment or a group trust, such that there were a small number of very large arrangements. The superannuation system in Australia and Dutch industry-wide schemes would be suitable; in the UK, NEST would be suitable, as would master trust structures.

The supplementary level

The same multi-employer structures could also provide supplementary benefits, in the spirit of the Swiss BVG/LPP, but using a combination of drawdown and ALDAs as suggested by the Chilean system. The ALDAs and drawdown pots could both be funded by regular contributions. This is again influenced by the Danish ATP. This part of the arrangement could be designed as such:

- Contributions paid as the same percentage of earnings above the cap, perhaps subject to some upper limit
- 16% of the contributions being paid to the matching fund to provide fixed, advanced-life collective deferred annuities (ALCDAs)...
• which are payable from 20 years after retirement
• 80% of contributions paid into a target date fund, intended to convert into a decumulation fund at retirement...
• whose assets would be completely exhausted by the time the ALCDA comes into payment
• 4% of the contributions are paid into the growth fund...
• which is used to fund increases in the deferred and current ALCDAs (subject to the caveats discussed above)...
• and, if the anticipated ALCDA income rises above the current decumulation income, an increase in this decumulation income is provided through an increase in the value of the decumulation fund
• The payment date of the ALCDA could also be adjusted using actuarial factors
• The variability of the retirement date for both the ALCDA and the immediate collective annuity

This approach would allow investors to take more risk with assets above the basic level (to the extent that they had such investments), but would convert the decumulation challenge from an open-ended problem to one with a fixed endpoint. Furthermore, because the ALCDAs would be collectively provided, they would not attract the significant capital requirements associated with policies provided by insurance companies — or rather the capital requirements could be met by the growth fund, which would ultimately be distributed. The price for this freedom is that the absolute guarantee is lost — in extreme circumstances, pensions could fall. However, the growth fund should not only cover this risk, but provide an element of inflation protection.

The decumulation fund

The nature of the drawdown fund is worthy of further comment. As mentioned above, the decumulation fund can be exhausted predictably over a known period because the ALCDA is used to provide an income from 20 years after retirement.

There are several features that such a decumulation fund could have. Fixed income assets could be chosen such that their maturity profile would give a smooth pattern of payments over the term of the product, allowing for predicted levels of default, and losses of income arising from post-downgrade rebalancing (selling a downgraded bond for a loss and purchasing a lower-yielding replacement with the proceeds). However, for asset classes whose incomes are less certain, an alternative approach is needed. Growth assets such as these are necessary if the income from such a fund is to have any chance of beating inflation. One decumulation approach is to separate the income paid by the assets and the sale of capital. The reason for this separation is that asset values are typically more volatile than the income streams produced by those assets. This means that taking a fixed proportion of an asset each period — made up with a varying proportion of income and asset sale — can result in a more volatile cash flow than is strictly necessary.

EXHIBIT 14: DECUMULATION OVER 20 YEARS USING A 1/N RULE

The question then becomes: how much capital should be sold each period? The simplest approach is a $1/N$ (“one-over-N”) rule. This involves dividing the capital by the number of years remaining. However, such an approach has drawbacks, mainly linked to the fact that too much capital is taken in the early years. The key issue is that if the expected growth in the income is fixed over time, using $1/N$ results in the rate of growth of payments (capital plus income) falling. This can be seen by considering an equity portfolio yielding an income of 4%, with that income growing at 3% per annum. Decumulating the capital using the $1/N$ rule results in payments that increase at first, but ultimately fall, as shown in Exhibit 14.

An alternative approach is to use an actuarial accumulation function: $(1+i)^N-1/i$. This function calculates the amount to which a series of equal, unit payments received for N years will sum at a given rate of interest, $i$. An accumulation at a positive rate of interest over N years will always be bigger than N. As such, using this function to determine how much money to take will result in less capital being taken in the early years. In fact, if the interest rate used to calculate the...
accumulation function is the dividend yield — so, using the example above, \( i = 4\% \) — then the payments received would be expected to grow at the same rate as the income (assuming no capital sales), in other words 3%. This is shown in Exhibit 15.

The accumulation approach has another advantage in the real world. If asset values fall, incomes from assets do not typically fall as sharply (if at all). The result of a fall in asset values with little or no subsequent fall in income is for yields to rise. If the interest rate — taken as the yield — used in the accumulation function rises, then the value of the accumulation function also rises. This means that when the result of the function is divided into the fund value to determine the level of capital to be taken, not only is less capital withdrawn (due to the fall in fund value), but proportionally less capital is withdrawn. In other words, capital is taken at a lower rate when markets have performed badly.

Combining this approach for equities with maturity-specific portfolios of corporate and high-yield bonds could give a portfolio as shown in Exhibit 16.

Encourage or compel?

One area that has been touched on — particularly in relation to DA from DC guarantees — is the impact that they might have on encouraging members to opt into pension provision. This implies that individuals will have a choice over whether to make provision for their pension, as is currently the case in the UK with NEST. On the other hand, contributions to APT in Denmark are mandatory, albeit at a low level. Nor is there an opt-out available in Australia, where employers must make significant contributions on behalf of members.

This raises the question as to whether compulsion is necessary for a pension system to provide sufficient coverage for a population. We do not seek to answer this question in this paper, not least because it is a question of philosophy as much as anything else. Whilst in some countries compulsion might be expected or even welcomed, in others it might provoke outrage. Indeed, even the collective nature of ALCDAIs might be too much for more individually-minded nations. However the question of compulsion and its place in the pensions landscape will continue to arise.
Conclusion

There is a wide range of pension models in use in the world today. These are each designed to fit into the broader economic and social structures of their countries. However, there are aspects of many of these systems that might be transportable.

The structure proposed here — a combination of drawdown and collective annuitisation, part of which is deferred, might be regarded as too paternalistic for some countries. It could also require changes in legislation before it could be fully implemented, particularly in relation to collective immediate and deferred annuities. Sufficient scale is also critical. However, even the combination of an ALDA that is funded over the accumulation period and paid from a collective structure, combined and interacting with a fixed-period decumulation fund offers an improvement on current arrangements. Certainty of income is available in extreme old age, together with the possibility of enhancements to this income. This is then supplemented with a decumulation fund that can benefit from both market and illiquidity risk whilst avoiding the capital charges typically associated with longevity risk. It is particularly attractive as it removes risk from sponsoring employers, but gives certainty to individuals without the high cost normally associated with such a trade-off. As such, it suggests a way forward for defined contribution.
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