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Workplace-Linked Pensions for an Aging Demographic

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Pensions and population aging intersect in two ways. First, demographic change threatens the sustainability of traditional pay-as-you-go social security pensions, leaving workplace-linked pensions with a greater role in retirement provision. Second, as the Baby Boom generation enters retirement, new challenges arise around its retirement support. This chapter reviews some of the implications of population aging for workplace pensions in this new environment, outlines market considerations important for workplace-related pension design for the future, and discusses how governments can create an environment supportive of workplace-related pensions, should they wish to do so. We conclude that workplace-linked retirement saving systems will be asked to do even more than in the past, given the financial stress that pay-as-you-go government-run Social Security plans are confronting in the face of an aging demographic. This will require further product innovation and additional research.

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Pensions and population aging intersect in two ways. First, demographic change threatens the sustainability of traditional pay-as-you-go social security pensions, leaving workplace-linked pensions with a greater role in retirement provision. Second, as the Baby Boom generation enters retirement, new challenges arise around its retirement support. This chapter reviews some of the implications of population aging for workplace pensions in this new environment, outlines market considerations important for workplace-related pension design for the future, and discusses how governments can create an environment supportive of workplace-related pensions, should they wish to do so. We conclude that workplace-linked retirement saving systems will be asked to do even more than in the past, given the financial stress that pay-as-you-go government-run Social Security plans are confronting in the face of an aging demographic. This will require further product innovation and additional research.

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I. Introduction

All developed and most emerging nations provide some form of retirement support to their elderly citizens, though these programs are structured very differently from one country to the next. The “three pillars” classification provided in Figure 1 is useful for understanding the key components of these schemes internationally. In most countries, the first pillar represents a Social Security or safety net benefit typically provided and financed by government. The second pillar has tended to be earnings-related and compulsory; it may be government-financed/provided (the most common OECD model), or privately-financed/provided (as in Australia and Chile). The third pillar often takes the form of voluntary retirement saving, typically backed by assets accumulated in a funded pension account via tax-preferred contributions. Examples of third pillar vehicles include workplace-based pensions, such as 401(k) plans, individually-managed Canadian registered retirement saving plans (RRSPs), and US Individual Retirement Accounts (IRAs).

Figure 1 here

Our focus in this chapter is on workplace-related pensions, in which employers tend to play key roles in structuring contributions, investment menus, and, often, payouts. In particular, we examine the future role for workplace-based schemes in the face of population aging. While the life cycle model predicts that individuals will save, invest, and draw down their wealth over their lifetimes, recent research suggests that people often find such plans difficult to implement in practice due to behavioral shortcomings, market imperfections, and financial illiteracy. Accordingly, workplace-based earnings-related saving programs can be an attractive means to

the desired end of generating retirement benefits. Moreover, employers too can benefit from offering workplace pensions to help manage their workforces. And in many countries, governments incentivize retirement saving in pensions via some form of tax preference for retirement saving. For these reasons, we argue that workplace-related pensions will continue to have an important place in managing retirement risk management.

Notwithstanding the importance of workplace-related pensions in the context of population aging, few nations have thought systematically about how to encourage the growth and resilience of these institutions. Naturally, countries will vary in their approaches as local attitudes toward paternalism, safety net schemes, capital and insurance market capacity, and regulatory structures will shape feasible policy and product initiatives. Yet beyond these factors, disagreements about the proper objective toward pensions have resulted in uneven environments in which workplace pensions have developed.

One reason pensions emerged is that, in the past, governments have used them to reward and pacify returning military forces who might have otherwise posed threats to the national order. As far back as the Roman Empire, army personnel who had seen active service were given pensions with characteristics that foreshadowed modern day public sector plans. For instance, in 13 BC, the Roman Emperor Augustus promised veteran legionnaires a pension after 20 years of service with a replacement rate of between two-thirds and three-quarters of a laborer's income (Clark et al. 2003; Craig, nd). Pension schemes for military personnel were also established in the late 16th and early 17th centuries in England, and in the US they were instituted after the Revolutionary War, and more systematically, in the wake of the Civil War (Lewin 2004).

Non-military pensions followed slowly. In England, for instance, public employee pensions were established in the early 1700s by the Custom and Excise Department to retain senior staff

and further workplace relations. This was followed in 1712 by the launch of a Superannuation Fund to public workers unable to continue employment. By the early 19th century, civil servant pension schemes were in place across the UK. Private company schemes were established by firms with a close public sector connection, such as the Bank of England and the East India Company. Through the 19th century, a number of large companies gradually introduced workplace pensions (Hannah 1986).

As the public sector expanded and personal income taxation became significant, tax breaks became a potential instrument for governments to encourage pension saving. In 1921, the U.K. Government introduced tax relief on pension contributions. This practice had its origins in the treatment of friendly societies which already enjoyed tax advantage (Fry et al. 1985). In turn, this initiated a pattern of public policy towards workplace pensions which has become almost universal practice in developed economies globally. We take up the economic impact of this taxation stance further in section IV.

The US came somewhat later to widespread pensions (McGill et al. 2010). The first corporate pension was offered by the American Express Company in 1875. Retirement plans were extended to the civilian sector slowly, with many not receiving pensions until after the First World War (Clark et al. 2003). Private pensions grow rapidly during World War II, as retirement benefits were permitted in lieu of pay increases during the period of wage/price controls. Whereas in 1940, fewer than one-fifth of private sector employees were covered by workplace pensions, the fraction stood at over half of private sector employees and three-fourths of governmental workers were enrolled in workplace retirement plans by the 1980's (McGill et al. 2010).

Thus significant retirement plans in the workplace have been around in the developed world for some time, and indeed in many countries they developed well before social security-type government programs were set up. Yet the advent of national Social Security plans altered the way in which workplace pensions were perceived. To this we turn next.

II. Population Aging and Workplace-Related Pensions

Workplace-related pensions have usually been conceived as add-ons to the government schemes, given national old-age public systems, also known as Social Security schemes in the Western world. Moreover, the old-age public schemes have usually been financed from current tax payments on a pay-as-you-go (PAYG) basis. While this approach has worked well for most of the 20th century, it has become increasingly unsustainable in the face of rising numbers of elderly and only modestly growing – or even shrinking – working age populations to keep it afloat financially. In light of these stresses, along with the fiscal repercussions of the global financial crisis, many nations are now confronted with the need to reduce public plan generosity, as well as raise taxes to pay for the benefits (OECD 2015)

A. Implications of Population Aging for Social Security Systems

All developed countries have some form of PAYG retirement provision, and all are aging at historically unprecedented rates. Some countries, such as the US and Australia, are relatively young, demographically speaking, due to higher fertility and immigration rates. Accordingly, they face a somewhat delayed strain on public pensions compared to older economies with higher median ages and, more importantly, higher dependency ratios. For instance, many European countries provide a glimpse of what can happen to national pensions that have over-promised benefits. Figure 2 summarizes a series of liability projections and policy changes

motivated by a concern to buttress Social Security sustainability for countries in the European Union (European Commission 2012).

Figure 2 here

The pink columns in Figure 2 indicate how demographic change is projected to increase public outlays in percentage points of GDP, to 2060. Consistent with the ubiquity of population aging, all such outlays go up. Especially in central and eastern European nations, these increases appear on their face to be unsustainable. The columns below the horizontal axis indicate how future liabilities are already being curtailed by various policy adjustments. Most prevalent is the adjustment in benefit ratios, which refers to the value of an average pension (public pension spending/number of pensioners) relative to the average wage (proxied by the change in the GDP per hours worked). These changes reflect not only explicit changes in the pension to labor income replacement ratio, but also from changes in indexation or in the value of spousal and survivor pensions. The employment rate effect reflects changes in the ratio of the population to working people in the 15-64 age bracket, that is, the reciprocal of the employment rate. As the employment rate has risen via female labor force participation over time, and as larger proportions of older people remain in the labor force (perhaps as a result of pension policy changes), the ratio of pension expenditure to GDP falls. Coverage ratio reductions reflect changes in eligibility and vesting requirements, among other factors.

The red diamonds in Figure 2 show the net result of these opposing forces. In the older European nations such as Germany, projected increases in public outlays are significant. But these overall increases also mask the reduction in per capita benefits shown by the blue columns. It is worth underscoring that the patterns in Figure 2 capture only changes undertaken or legislated thus far. Nevertheless, it seems likely that further benefit reductions will be required

over the horizon captured by the chart to bring about more sustainable public financing. Of course long term projections such as these are only illustrative, as they depend on assumptions regarding variables such as fertility and productivity about which little is known far into the future. Yet the Figure 2 does support the belief that state pensions are coming under increasing stress in the face of an aging demographic.

While several countries have worked to reduce benefits for future retirees, some have taken steps to reduce pensions already in payment. For instance, Japan and the Netherlands have both experienced reductions to pension payouts, and Italy cancelled inflation indexation for 2012 and 2013. Other countries, for example Sweden, have legislated for this possibility (OECD, various years)

Because of the likely need to curtail public plan benefits and raise retirement ages, some analysts have suggested that workplace-linked pensions can be a vehicle to provide better retirement benefits than in the past. Yet workplace-based pensions too have undergone stress and change. For instance 50 years ago, employment-based pensions were typically of the defined benefit (DB) variety, which paid retirees an income throughout retirement, which was related to their pre-retirement pay. Not only were these plans tax-preferred, but employers also favored them as a means to attract, retain, and retire workers over their lifetimes (Lumsdaine and Mitchell 1999). Nevertheless, DB plans have fallen out of favor in many circles, particularly since the global financial crisis. Not only did DB plans suffer from market volatility, but rising longevity (especially at later ages) has been a major factor. Moreover, employers were permitted to contribute less than what was necessary to maintain full funding for these plans, and many workers have found their retirement plans dashed in the event of employer bankruptcy paired with inadequate plan funding (c.f., Sass 1997). Similar problems are also now plaguing public

sector DB plans, in the US (Novy-Marx and Rauh 2011, Rauh and Novy-Marx 2011) and elsewhere (c.f., Maurer et al. 2008). As a result, employment-based DB pensions have increasingly been frozen and terminated. In their place, there has been a widespread move to defined contribution (DC) plans in their place.

B. Developments in Workplace-Related Pensions

Workplace-linked pensions require that both employers and employees see value in their provision. From the employer's perspective, pension provision can reduce staff turnover and labor market transaction costs, thus making employees more productive, and offer effective retirement management. In addition, pensions help some employers attract personnel with particularly desirable characteristics, including those who have low discount rates and are willing to defer gratification in the form of deferred compensation (Gustman and Mitchell, 1992; Gustman et al. 1994). From the employee's viewpoint, a workplace pension is a tax-qualified way to save for retirement, a topic we take up below in more detail. Additionally, a pension plan provides workers with the opportunity to participate in the capital financial market at a lower cost than individual saving (Bodie 1990, 1992). DB plans also offer income replacement insurance, by virtue of their paying lifetime annuity benefits, as long as the sponsoring employer has sufficient assets to pay promised benefits.

While DB pensions dominated the workplace pension environment for decades, there has been a long-term trend away from this approach, and toward DC plans instead. In DB plans, retirement benefits are defined in a formula which is a function of pay and years of service, whereas in the latter type, only the contribution is stipulated, but benefits are not known prior to retirement. Though DB plans still claim many members, particularly in the public sector, in many countries they are now largely closed to new entrants: this is the case in the US, the UK

and Australia, for example. Moreover there have been widely-publicized bankruptcies of large DB plans around the world, including those of Bethlehem Steel, the major US and Japanese airlines, Ansett Air in Australia, and Waterford Wedgwood (the UK and Ireland) These and potentially many others to come in the public sector underscore the reality that what had been perceived by many as “less risky” DB pensions did not, in fact, turn out to be secure.

It is useful to provide some scale to this trend. In the U.S., the fraction of private wage and salary workers in DB plans almost halved from 1980 and 2008, from 38% to 20%. At the same time, the proportion of workers participating only in DC plans rose from 8% to 31% (Butrica et al. 2009). Moreover, hundreds of private sector plans have been frozen, and additional employers will do so in the future. A plan freeze tends to offer existing participants retirement benefits based on their accruals up to the date of the freeze, but no additional benefits; new hires cannot join the old DB plan, and generally participate in a new DC pension. Thus while about half of the US workforce had a pension plan in 1980 as well as today, the mix of plan types has changed substantively. A similar trend has taken place in the UK. The percentage of new employees able to join DB plans plummeted from 67% to 11% from 2002 to 2008 (Butrica et al. 2009), and the proportion of pension assets in terminated or frozen status nearly doubled between 1998 and 2006 (Munnell and Soto 2007).

One reason for these changes appears to be government regulation and unfriendly tax provisions. The adoption of transparent financial accounting standards and the taxation of “excessive” accumulations triggered the decline of DB plans in the UK (Banks et al. 2005). In Japan, a similar result followed the introduction of pension accounting standards (Huh and McLellan 2007). In the US, increased regulation surrounding the administration of DB funds developed alongside tax changes making it easier to set up DC plans. Moreover, higher DB plan

insurance fees charged by the government reinsurer, along with smaller tax incentives associated with DB plans, have taken their toll (Butrica et al. 2009).

Nevertheless, additional forces have also been at work. First, the Western world's shift away from manufacturing where workers often held lifetime jobs, toward service and technology industries where jobs are short term and workers are mobile, reduced the value of DB pensions which rewarded lifetime employment (Mitchell 2000). Second, many workers have come to prefer DC plans due to their portability, transparent balances, and control over asset management (Broadbent et al. 2006). Third, employers have increasingly grown concerned over the legal and financial risks posed by DB plans to their organizations. Given the rise in longevity late in life, the costs of paying lifetime incomes has proven to be higher than expected. Moreover, funding calculations rely on accurate projections of future benefit liabilities as well as returns on pension assets. But in point of fact, stock market crashes, contribution holidays, and rising pension insurance premiums, have made it difficult for DB plan sponsors to manage plan costs (Barr 2006).

By contrast, the budgeting and governance consideration making DB plans difficult for employers to manage appear to be alleviated in DC plans, as many risks are now transferred to employee. Yet as we discuss in Sections III and IV, the transfer of responsibility to employees has, in turn, given rise to new concerns about retirement risk management. These range from consumer competence regarding complex choices, regulatory and tax design, and simple inadequacy of retirement saving. Employees are often financially illiterate, rendering them unable to make informed decisions about how much to save, where to invest, and how to draw down their retirement assets (Brown et al. 2016; Lusardi and Mitchell 2007, 2008; Mitchell and Lusardi 2011). As a result, retirement wellbeing for DC-covered workers becomes heavily

dependent on plan design features such as defaults which may be expensive and/or inappropriate for many workers (Keim and Mitchell 2016).

In addition to the DB and DC polar cases, some employers and even some governmental entities have devised hybrid pensions integrating elements of both. For instance, some DB plans offered by US states link participant contributions to their plan's funding status (Neumann 2010). The DC pension system covering teachers and research personnel offers a variety of DB-like features including annuitization options at retirement (Goodman and Richardson 2016). Hybrids have also been adopted in Switzerland, the Netherlands, and Belgium (Wesbroom and Reay 2005), again with a variety of features. For example, the Swiss hybrids pay a guaranteed investment return underwritten by an insurance company, but from the employer's accounting perspective it is categorized as a DC plan. The Dutch defined ambition approach specifies benefits as deferred annuities, but it also requires participants to share investment risk and longevity uncertainty (Bovenberg et al. 2016). US cash-balance pensions are technically defined benefit plans but behave like DC plans, inasmuch as participants earn credits per year of participation which accrue to determine the asset value available at retirement (Clark and Schieber 2004). In other words, mixed DB/DC pension plans may, in the future, become more popular (Giertz and Papke 2007).

In short, demographic trends and particularly rising mature age life expectancy, changes in industrial structure, and increasingly volatile financial markets, have combined to expose the flaws in DB plans. DB plans have been shown to be vulnerable to capital market risk, longevity risk, and corporate bankruptcy risk. Public employee plans, to which we return in Section D, face solvency issues both in the US and internationally. These circumstances have paved the way for DC plans, in which risks and decisions are borne by the employee rather than the plan sponsor,

and this has spawned a new set of policy and product challenges. Yet as we see next, DC plans present a new set of issues.

C. Issues with Defined Contribution Pensions

Defined contribution plans have a number of policy and choice challenges of their own. First, they frequently necessitate that employees make a decision regarding whether to join the plan, how much to contribute, how to invest, and how to draw down pension wealth. These choices do empower individual participants, but there is evidence to suggest that many and perhaps the majority of workers devote little time and effort to making these decisions (Agnew et al. 2003; Bateman et al. 2010). Traditionally, DB plans embedded incentives to shape desired employee behavior, particularly when employers faced structural capital and labor market shortcomings (Bewley 1999; Gomes and Michaelides 2005; Ippolito 1985, 1997; McCarthy 2006). These incentives included seniority-based pay scales paired with DB plan benefit rules encouraging retirement among the most highly-paid (Lazear 1979) and those with deteriorating job skills (Luzadis and Mitchell 1991). By contrast, DC plans have few such employment and retirement inducements, other than attracting workers who seek a means to save in a tax-qualified vehicle (Gustman et al. 1994). In their absence, some employers have offered so-called “early out window” programs (Brown 2000), which provide one-time lump sums to older workers electing to leave their jobs during a specified, and usually short, time period.

Second, DC plans restrict risk-sharing opportunities across cohorts. This is important because peoples’ accumulations in a standard DC plan are determined by their contributions and returns on their investments, with the latter dominating later in life. By contrast, in a DB plan, the sponsor must contribute, invest, and pay lifetime benefits, thus somewhat shielding participants from capital market shocks. Additionally, in some countries, DB plans are also

protected by government guarantees, whereas return volatility in DC plan investments can produce different payouts for those reaching retirement, even if they have earned the same lifetime pay. Much debate about current pension policy is directed to these sets of issues, discussed in more detail in Section IV below.

Third, one of the most difficult choices that DC plan participants must make is how to manage their pension assets throughout retirement. Yet some retirees face cognitive decline in their later years, and there is evidence suggesting that poor decision-making is a consequence of cognitive decline among older persons even when they do not have Alzheimer's disease or mild cognitive impairment. In fact, even people considered "cognitively healthy" can have subtle age-related changes in cognition producing detrimental effects on judgment (Boyle et al. 2012). Moreover, the links between cognitive capacity and decision-making become increasingly fragile at older ages. For example, Han et al. (2015) found a large discrepancy between cognition and decision-making in older adults. Of course other factors matter, including perceptions of trust, risk aversion, personal goals and values, expectations about aging, affect, motivation and wisdom (e.g., Han et al 2015). We take this point up below, in section III A, in detail.

A fourth, and related point has to do with annuitization, or the lack thereof, in DC plans. Since workers tend to view their DC plan as a wealth accumulation vehicle, they tend not to focus on the core purpose of a pension, namely to pay retirees a regular monthly income for life. US employers have demonstrated reluctance to include annuities in the payout menu, mainly because of concern that they will experience lawsuits if the annuity insurer fails. In response, some regulators have announced plans "to give employees and employers more options for putting the pension back" into DC pensions (Iwry 2014). Others have called for a restatement of the retirement plan's main goal, namely the provision of retirement income (Mercer 2012).

Some of the aforementioned interest in hybrid pension plans has also stemmed from this concern. More generally, however, there is evidence that people who lack financial literacy tend to not understand annuities, and are susceptible to framing, thinking they are well-set for retirement when actually they face low lifetime incomes (Brown et al. 2001, 2008, 2016 and forthcoming). Some regulators have recommended that showing participants projected retirement income values instead of accrued assets could be useful in combatting complacency (US Department of Labor 2013).

A fifth consideration regarding DC plans has to do with governance. In some cases, governments have appropriated plan assets via expropriation (as in Argentina and Russia), or populist early release measures that subvert the system's purpose.¹ In other instances, regulation has been deemed necessary to ensure that fees and commissions are reduced, conflict of interests are minimized, and the assets invested in the best interest of the participants rather than meeting other needs (McGill et al. 2010).

In short, saving and investing via any sort of group retirement system can offer lower fees compared to individual saving, as well as tax breaks (see Section IV). In the past, DB pensions were used by employers in the past to attract, retain, engage, and retire workers. Now that DB plans have phased out in many countries, many employers are offering DC plans in their place. While DC schemes could be structured to include features similar to DB pensions, many have not. In some ways employees are better off, as they can take their retirement savings with them when switching jobs, and they can save and invest as appropriate to their own needs. Moreover they are less exposed to benefit cuts in the wake of plan sponsor bankruptcy. Yet DC plans also

¹ As of this writing, more than \$325B of private pension assets have been seized by governments around the world, including \$50B taken by the Argentine government (2008), \$200B by Ireland (2009), \$51B by Portugal, \$10B by Hungary, and \$7B by Russia. Citations available from the authors on request.

require that workers acquire a better understanding of what they need to accrue so as to meet retirement goals, along with the means to achieve those ends.

D. Public Sector Employee Pensions

While many of the issues raised above are present in public employee DB plans, public sector pensions are worthy of separate attention as well. One reason is that the threat of insolvency has become a critical problem for many state and municipal plans (Novy-Marx and Rauh 2011). Relatedly, public sector plans have offered various guarantees and options which, when properly costed, turn out to be extremely expensive (Mitchell 1998). In economies as far-reaching as Brazil, Chile, China, Russia, and India, government employee pensions are also often far more generous than private sector benefits, and the resulting “pension envy” has triggered social discontent and become a source of fiscal stress.

In what follows, we briefly review how public plans value their liabilities, the development of strong positive correlation between funding ratios and market performance, and factors inhibiting labor mobility. Some countries including Australia have taken a proactive approach to remediate these problems by moving from DB to DC plans, but this in itself has generated other implications.

Valuing Public Plan Liabilities. In practice, many public pensions compute the present value of their future liabilities using an expected return on investment assets (Brown and Wilcox 2009, Lucas and Zeldes 2009). This is justified by reference to rules stipulated by the Government Accounting Standards Board (GASB 2013).² This practice encourages public funds to invest in riskier but higher expected return assets, which in turn reduces the benefit liability calculations.

² More accurately, GASB requires that the funded portion of public plan liabilities to be discounted at the expected return on assets, while the unfunded portion is discounted at something closer to a long-term government rate. By contrast, private pensions generally use the borrowing cost of the pension plan sponsor, as in the US where the corporate bond rate is required under federal legislation (McGill et al. 2010).

Particularly in times of financial and fiscal crises, this practice permits public plans to cut contributions – with the idea that contributions would need to rise in better times. This practice has increased the volatility of investment returns and led to long-term public plan underfunding. Moreover there is little standardization in pension discount rates, making it very difficult to compare funding ratios across public plans. For instance, Novy-Marx and Rauh (2011) report that discount rates used by state plans in the US range between 7% and 8.5%, with a mean of 8%. After correcting for disparate discount rates, state pension liabilities are been estimated to exceed \$3 trillion (Novy-Marx and Rauh 2011) versus \$1.4 trillion using self-reported discount rates (Pew Foundation 2012).

Other jurisdictions also allow public pensions to elect discount rates unrelated to the stability of benefit promises. For example, the Australian Accounting Standards Board (AASB) states that characteristics of pension liabilities should mirror the characteristics of pension assets (McGregor 2013). Similarly, the UK has allowed plans to use the yield on assets held by the scheme as the discount rate in valuing liabilities (The Pensions Regulator 2014).³

³ While the details are beyond the purview of the present chapter, it is worth noting that several methods have been used to value DB plan liabilities. These include the Projected Value of Benefits (PVB), the Entry Age Normal (EAN), the Projected Benefit Obligation (PBO), and the Accumulated Benefit Obligation (ABO). All methods converge to the same value at retirement, but throughout the life of the contract they vary considerably, and they have considerably different implications for the path of assets required to fund the future liabilities (Novy-Marx and Rauh 2011). The ABO is a simple measure that only requires the benefit formula, the current wages of the employees by years of service, inflation assumption and mortality tables. The benefit formula is usually the product of the benefit factor, years of service, and average wage of last several years of work. The ABO measure only accounts for benefits accrued to date, so it excludes future benefits to accrue with continued employment. Yet as workers gain more experience and advance in their careers, their wages are likely to increase which can leave the sponsor vulnerable to large incremental costs which are fairly predictable. The narrow focus of the ABO measure and its severe underestimation of DB liabilities have led to alternative methods of liability estimation. At the other extreme is the PVB, determined by discounting the future expected liabilities owed to current employees if they continued working, retired, and died according to actuarial projections. This second measure may greatly overestimate the total amount of liabilities prior to the retirement date because it assumes future service that may not occur and does not allow for changes in benefit accrual. Such limitations are remedied using adjustment factors, by the PBO (Lenze 2009) and the EAN (Winklevoss 1993) measures. The PBO method recognizes expected future wage growth but does not include future service, whereas the EAN method adjusts the PVB by discounted wages earned to date relative to the discounted expected lifetime wages, accounting for both time and mortality. Other methods have also been proposed, for example using option pricing (Biggs 2011). No one method is agreed and

Public Plan Funding Ratios vs Market Performance. A related but distinct issue is the over-reliance in market performance to generate income to meet funding liabilities. As mentioned earlier, the attraction of investing in high risk-high return assets has created a strong positive correlation between funding ratios and market performance in public pensions, leading to cyclical underfunding (Giertz and Papke 2007). They note that many states in the US closed or considered closing their DB plans to new entrants once the plans were actuarially fully funded. One may argue that the high risk-high return investment strategy paid off in that period, but this is unlikely to work well for pension funds that are quite underfunded. This is especially the case for plans in emerging economies. For instance Iglesias and Palacios (2000) report that the worst returns are generally produced by publicly-managed pension funds in countries with poor governance records.

The risk generated from the increasing correlation of funding ratios and market performance has been exacerbated by the lack of a generally accepted market benchmark. As a result, few public pension funds focus on minimizing liability risk in their investment stance, and hence few funds actively hedge their liabilities. Due to the increasing share of pro-cyclical risk assets such as equities in pension asset portfolios, public plan risk exposure can be as volatile as market performance (Pennacchi and Rastad 2011).

Labor Mobility. Another issue impacting public plans is that labor mobility has risen over the last several decades, yet DB plans reward those remaining with the employer for a career. This is sometimes offered as a reason to support moving to DC plans, and some countries are moving to integrate public and private employee pension arrangements. There is, however, rather limited evidence of inhibition of mobility changes resulting from pension plan design changes. Hernaes

used by everyone; in the UK, pension trustees funds are required to take advice from their actuary about whether to account for expected future pay increases for active members.

et al. (2011) analyzed administrative data in Norway and found little evidence of such an effect. By contrast, Clark et al. (forthcoming) found that turnover among new hires rose in the wake of the conversion from a DB to a hybrid DB/DC plan by the state of Utah.

The Outlook for Public Pensions. As relatively large cohorts of public sector employees are now reaching retirement age, this is likely to lead to higher pension outflows and greater stress on government budgets. Yet this demographic change could also provide an opportunity for public sector employment restructuring. Indeed in many countries, the public sector is moving away from a career system, where workers entered and retired with the same employer, to one where workers are recruited for specific posts rather than careers (OECD 2007).

At the same time, many governments have moved or are moving to DC plans for civil servants.⁴ The Australian case is of particular interest where public plan restructuring was built on the national earnings replacement pillar mandating employers to contribute a gradually increasing percentage of salary to private pension funds (Bateman and Piggott 2011). This mandatory contribution rate now sits at 9.5% and is projected to rise to 12%. Many employers, including public sector employers, offer additional benefits, and voluntary employee benefits are also permitted, tax preferred up to an annual contribution limit. This structure provided the framework allowing public employee DB plans to be progressively closed to new entrants, and currently only defense personnel and the judiciary continue to enjoy DB entitlements.

These global moves to DC will, in the long term, reduce fiscal pressures. Yet obligations to cover legacy costs from public sector entitlements will continue for several decades, as DB-covered workers retire and pass on. It is also worth noting that, in many emerging economies such as China and India, these legacy costs must be paid before the countries become rich.

E. Interim Summary

⁴ Takayama (2011) reviews several country experiences in reforming public employee pensions.

Workplace and Social Security retirement plans represent a major source of retirement wealth. For instance median Social Security wealth in the US comprises about 60% of retirement assets, and pension wealth another 20% (the remainder consists of net housing equity, 20%, and the remainder financial assets; Gustman et al 2010). While the global aging demographic makes it increasingly imperative that workplace pensions be strengthened, it seems unlikely that the move to DC plans will be reversed in the workplace. How DC plans might be modified to enhance their role in retirement security, and how they can be made more useful to the plan sponsors offering them as well as the employees taking them up, remain important policy and research questions to which we turn in subsequent sections.

III. Considerations for Workplace Pension Design

Next we turn to factors likely to be important for workplace pension designs in the future. Both employers and employees are likely to benefit from such structures if they are informed by recent research findings regarding financial literacy shortfalls and self-control concerns.

A. Decision-making and Commitment

To understand the key elements of pension design for the future, it is useful to review the literature on the determinants of pension decision-making. In particular we summarize what shapes workers' behavior regarding whether to enroll (when enrollment is voluntary), how much to contribute, how to allocate the investment portfolios, and how to manage payouts. In all of these domains, default behaviors have been analyzed and found to be significant. In the following section we discuss how policy settings can leverage these behaviors.

Enrollment and Contributions. In the old days, employee DB participation was usually compulsory, whereas joining a workplace-based DC plan has often been up to each employee's

election. Some countries do mandate participation – Chile, for instance, requires 10% of pay be saved mandatorily; Australia requires 9.5 rising to 12%; and Singapore has mandated varying rates over time. But in employee-choice settings, it was often the case that many workers never got around to joining their plans, even when they knew they should. For instance in the US, opt-in participation rates were often below 50%, whereas when employers automatically enrolled employees (while allowing them to opt out) participation rates rose to over 85% (Madrian and Shea 2001; see also Beshears et al. 2009, and Choi et al. 2004a and b). Carroll et al. (2009) found that when employees had to decide both to participate and select their contribution rate, this did raise voluntary enrollment patterns. There is also evidence that plan enrollment is discouraged by complexity, and that choice simplification increases participation (Beshears et al. 2011; Choi et al. 2003, 2009). In a recent reviewed of the determinants of plan choice by Choi (2015), key findings were as follows:

- People tend to choose a contribution rate which is a multiple of 5%, such as 5 or 10% (Benartzi and Thaler 2007; Choi et al. 2006, 2012;⁵
- Employee contribution rates can be easily influenced by mentioning arbitrary numbers, as found in several randomized field experiments, see Choi et al. (2012) and Goda et al. (2014).
- All else equal, women tend to contribute at higher rates than men (Huberman et al. 2007).

Other features of the choice landscape are also important determinants of DC plan participation. For instance some researchers have found that having an employer match boosts

⁵ In an unpublished paper cited in Benartzi and Thaler (2007), those authors argued that participants tended to choose multiples of 5% even though the analysis excluded plans offering matches at either the 5 or 10% levels. They thus ruled out the possibility that employees chose the number to maximize employer contributions.

enrollment,⁶ while other studies report a negative relationship (Choi 2015; Clark et al. 2000). Using administrative records on 401(k) plans, Mitchell et al. (2007) found that the effect of match rate was nonlinear, being positive for the first 3% of salary, ineffective on the next 3-6% of pay, and slightly negative on the next 6-8% of salary contributed for highly compensated employees. Nevertheless, employee understanding of these incentive structures is often seriously deficient, and Choi et al. (2009) reported that fewer than half of employees in a large company knew their company's match patterns.

There is also controversy over the impact of the employer-set "default" contribution rate on workers' saving rate decisions. Several studies have failed to identify any effect (Benartzi et al. 2013; Beshears et al. 2009; Thaler and Benartzi 2004), while others (Mitchell et al. 2007) showed that default contribution levels can serve as benchmarks for employee contribution rates.

Also important in workers' decisions to enroll are social network and peer effects, though the exact mechanisms are as yet unclear. For instance herding behavior could result from employees believing that others know more about investments than they, and they tend to "follow the leader." Alternatively, deviations from social norms may be deemed to be costly. Duflo and Saez (2002) devised a clever experiment using administrative data from a large university to study whether employee decisions to enroll in a retirement plan were shaped by other employees' behaviors in the same department. They found, quite interestingly, that peers had a positive effect on "untreated" co-workers. Yet peer effects do not always move in the direction of conformity. Beshears et al. (2015) disseminated information about peer behavior on savings rates in a 401(k) plan experiment, and they found the opposite reaction. In particular, providing people with information about peers' saving rates decreased nonparticipants' savings.

⁶ See for instance Brown et al (2006), Choi et al. (2002), Clark et al. (2000), Duflo et al. (2006), Dworak-Fisher (2011), Engelhardt and Kumar (2007), Even and Macpherson (2005), Huberman et al. (2007), and Mitchell et al. (2007).

The authors suggested that discouragement from upward social comparisons drove this reaction – that low income employees were discouraged from saving when they were presented with information about the saving behavior of higher income colleagues.

Saving rates are also influenced by peoples' tendency to downweight future events. For example, Bernheim (1994, 1998) analyzed surveys in which individuals were asked to assess their saving performance. His studies reported that people admitted to not saving enough, given the incentives they faced, and the median gap between US Baby Boomers' self-reported target and their actual savings rate was about 10 percentage points. This could be due to dynamically inconsistent preferences (Figure 3): that is, when small and large rewards are both far away (as they are, when viewed from the present), a somewhat more distant but larger reward tends to be preferred to a small reward. But as the time to the small reward grows shorter, immediate gratification overwhelms rationality, and the immediately available smaller reward is preferred.

Figure 3 here

Experimental evidence also supports the notion of widespread dynamic inconsistency in financial behavior. For instance, in an experimental setting, Thaler (1981) offered \$15 to participants and then asked how much more they would need to wait a month, a year, or 10 years. Respondents' answers ranged widely, from 345% as a one-month implied discount rate, to 19% as a ten-year rate. Supportive evidence in Figure 4 from Frederick et al. (2002) provides a graphical summary of a number of such experiments, showing how frequently early rewards are associated with heavy discounting of the future. For example, a recent study focused specifically on commitment, asking participants in a delayed reward experiment whether they would be prepared to pay for a future restriction on choice (Casari 2009). In over half the cases, people said they preferred commitment saving devices.

Figure 4 here

It is worth noting that several theorists have included in their models what have been called “hyperbolic” preferences (c.f., Laibson 1997) for policy evaluation purposes. For instance, Gul and Pesendorfer (2001) embedded self-control preferences in an overlapping generations model calibrated to the US economy. They compared the implications of various retirement income support programs in this sort of model with outcomes where preferences require a commitment device to save for retirement, and in the latter case, they showed that retirement income support programs were quite appealing.

The relevance for workplace-based pensions is clear, as these can be seen as being the equivalent of commitment devices.⁷ In practice, we know that most participants stick to the employer-specified default contribution rates even when they have many other options (Beshears et al. 2009; Choi et al. 2002, 2004a; Madrian and Shea 2001). Accordingly, the evidence confirms that defaults matter. We return to this issue below.

Portfolio Choice. Analysis of portfolio choice in retirement funds has also found extensive evidence of inertia when workers are automatically enrolled in their DC plans. That is, many plan sponsors know that plan participants will not be confident or knowledgeable enough to choose an asset allocation, and hence they perceive the employer-set default as implicit advice (Agnew et al. 2003; Beshears et al. 2009; Choi et al. 2002; Madrian and Shea 2001; and Mitchell and Utkus 2003; 2004). Indeed very few workers ever trade in their pension portfolios (Agnew et

⁷ Social Security has also been seen as a commitment device, as noted by Samuelson (1987): “Much that a ... public system accomplishes could have been contrived privately. But it wasn’t. And the voters are at least partially aware of their own imperfections. Models that ignore this miss an important point of the problem.”

al. 2003; Ameriks and Zeldes 2004; Beshears et al. 2009; and Mitchell et al. 2006). As a result, only 20% of plan members executed any trades over a two-year period (Mitchell et al. 2006).⁸

Evidence as to which employee sub-groups tend to be more versus less active in their pension investments includes the following:

- Higher-paid and longer-tenure employees are more active and aggressive in portfolio choice management, and also more likely to invest in equities (Agnew et al. 2003; Mitchell et al. 2006).
- Women are generally more conservative retirement plan investors than men. Evidence comes from both Australia (Watson and McNaughton 2007) and the US (Agnew et al. 2008, 2011; Arano et al. 2010; Neelakantan 2010).
- Married members tend to invest more in stocks, and men are more likely to manage their pension assets actively (Agnew et al. 2003; Mitchell et al. 2006).
- Older members are more likely to manage their assets actively and elect less risky portfolios (Agnew et al. 2003, for the US; Cappelletti et al. 2014 for Italy). Interestingly an experimental Australian study found that young subjects were more risk-averse than older ones (Bateman et al. 2010; Gerrans and Clark-Murphy 2004).
- Peer effects also matter. Lu and Tang (2015) found that plan participants were influenced by their co-workers, particularly being likely to increase (decrease) their risky share when they had lower (higher) equity exposure than their co-workers in the recent past.

Other studies have shown that changes in health status impacts workers' portfolio choice. For instance Rosen and Wu (2004) reported that poor health reduced the probability of owning retirement accounts, bonds, and risky assets, but increased the chance of holding relatively safe

⁸ Notably, evidence of inertia is also found in portfolio rebalancing even during the period that stock price rises rapidly (Mitchell et al. 2006).

assets.⁹ Similarly, households in poor health tended to allocate more of their wealth to safe portfolios (Cardak and Wilkins 2009).

Payouts. Employer-set rules for pension payouts are also potentially powerful in shaping retiree payout patterns, although more research is needed here. Gazzale et al. (2008) reported that when annuities were the default approach this boosted annuity take-up, although this finding was based on experimental rather than real-world evidence. Bütler (2016) and Bütler and Teppa (2007) studied employer-based pension plans in Switzerland, and they compared pension funds which had a lump-sum default with others having an income default. They found that the form of payout chosen was strongly influenced by default settings, but also that retirees having low accumulated retirement assets were likely to choose a lump-sum.

Major attention has been given to the impact of framing. The basic idea is that the form of payout preferred will be strongly influenced by the way in which retirement resources are presented: as an investment, or wealth accumulation, or as a consumption stream. Analysis has often focused on annuity purchase. Hu and Scott (2007) suggested that by framing annuities as risky gambles, mental accounting and loss aversion contribute to the unpopularity of annuities.

Brown et al. (2008, 2013, and forthcoming) have demonstrated that framing and complexity help explain why annuities are so little demanded. They note that when consumers evaluate annuity products using an “investment frame,” annuities appear quite unattractive. But annuities are appealing when presented as providing lifelong consumption that focuses on risk and return. Their evidence shows that whereas 72 percent of respondents say they would favor a life annuity over a savings account when the choice is framed in terms of consumption, only 21 percent of respondents prefer it when the choice is framed in terms of investment features. Other

⁹ They define risky assets as stocks and mutual funds; while safe assets are defined as checking and saving accounts, money market fund, CDs, government saving bonds, and T-bills.

studies in this vein include Agnew et al. (2003) who showed that framing can substantially influence payout choice, in lieu of a default payout setup. In the Chilean setting, Hastings et al. (2011) showed that people with lower levels of education, income, and financial literacy were more responsive to framing. Bockweg et al. (2016) surveyed more than 3,000 members of an occupational pension plan in the Netherlands, and confirmed evidence of framing and default setting effects.

B. Knowledge and Financial Literacy

In the last decade, researchers have increasingly sought to understand how financial literacy (or lack thereof) shapes behavior. The “Big Three” financial literacy questions developed by Lusardi and Mitchell (2005, 2011, 2014) have now been asked in two dozen countries, and they are as follows: “(a) If \$100 earns 2 percent per year for 5 years, how much will you have in the account? (more than \$102, exactly \$102, less than \$102); (b) If the interest rate on your savings account is 1 percent per year, and inflation is 2 percent, can you buy more, the same, or less in a year?; and (c) Buying a single company stock usually provides a safer return than a stock of a mutual fund. True or False?” In the US, only 67, 75, and 52 percent of respondents to the Health and Retirement Study could answer the questions correctly, respectively; and only one-third could give correct answers to all three. In particular, women, non-Whites, and the low-paid tend to be less financially literate than their counterparts, potentially leaving these groups most vulnerable to poverty in retirement.

This work has demonstrated that people lacking knowledge of the mechanics of saving and decumulation are likely to make potentially disastrous mistakes. Moreover poorly-informed individuals tend to not understand their workplace pensions, not to plan for retirement, and are less responsive to pension incentives (Chan and Stevens 2008; Dushi and Honig 2015; Lusardi

and Mitchell 2007). Moreover, the financially informed are less likely to pay high pension management fees, they invest more sensibly, and they tend not to extract home equity using expensive methods (Hastings et al. 2011; Lusardi et al. forthcoming).

C. Interim Conclusions

The existence of workplace-linked pensions throughout the developed world attests to their value for both employers and employees. Nevertheless evidence suggests that different pension designs elicit differential behavior by worker type, and according to choice domain. This is to some extent attributable to heterogeneous circumstances and preferences, though there is evidence that financial illiteracy, confusion in the face of complexity, and behavioral biases also partly explaining choice outcomes.

IV. Policies and Products

Next we turn to ways in which pension policy reform and product innovation might encourage choices and broaden options to yield improved outcomes. Specifically we discuss how governments and financial players could engender an environment more supportive of workplace pensions, should they wish to do so. In turn, we take up tax incentives, policy regarding competence and behavior, and ways to enhance the development of markets that could help manage retirement risk.

A. Tax Incentives for Retirement Savings

In many nations, policymakers have provided incentives for workplace pensions via tax preferences as well as other regulatory action. Most developed countries offer something close to an expenditure tax treatment for pension saving which provides a strong motivation for pension provision in high-tax jurisdictions. The challenge of pension taxation design within an income

based tax structure is to fashion tax (and transfer) policy that (i) aligns domestic saving as closely as possible with efficient self-provision levels, while (ii) providing adequate retirement income, and (iii) minimizing distortions affecting the timing of retirement and asset choice.

The types of tax structures frequently encountered across the world are twofold. In the first, contributions are taxed at the marginal personal income tax rate, exempting both investment returns and benefits. This is known as the “TEE” (tax/exempt/exempt) regime. In the second case, known as the “EET” approach (exempt/exempt/tax), contributions and investment fund earnings are tax-free, while personal income tax rates are applied to benefits when they are paid out. As shown by Kingston and Piggott (1993), these two regimes are identical in present value *ex ante* equivalent if income taxes are proportional. With a progressive tax structure, the equivalence breaks down because contributions and benefits are taxed at different points on the marginal tax rate schedule.

How pensions relate to earnings taxes is more complex, differing across countries. Earnings taxes are likely to lead to earlier retirement decisions, because the earnings tax is back-loaded in the life cycle, and this is when retirement choices are made. Most of the accumulation late in the life cycle comes from investment earnings, not contributions. In their model, Kingston and Piggott (1993) assumed a certainty world in which investment returns were fixed at a risk-free level. They proved that with a proportional tax, contributions and benefits taxation of pensions are formally equivalent, but that no equivalence principle could be derived for taxation of pension fund earnings, suggesting that the taxation of fund earnings would be likely to introduce unnecessary complexity.

The most recent authoritative policy document covering this issue, the Mirrlees Review, recommended that in general, earnings on savings above the risk-free rate be taxed, but that full

expenditure tax treatment for pension fund earnings was probably appropriate, citing both complexity and the need to encourage pension saving as reasons for this position (Mirrlees et al. 2011). Taxing pensions on an expenditure tax basis is appealing from an economic efficiency perspective, because it eliminates both inter-asset and inter-temporal price distortions. The first of these arises principally because owner-occupied homes in many countries receive expenditure tax treatment. Along with pensions, this is the major life cycle asset held by most households. Treating them very differently leads to asset misallocations. Efficiency costs associated with this distortion are old in the literature, but were found to be substantial (e.g., Hamilton and Whalley 1985).

A second price distortion avoided by expenditure tax treatment of pensions relates to the choice between consumption during the working life versus during retirement. The prices of present and future consumption are not distorted by an expenditure tax, whereas under an income tax structure, future (or retirement) consumption is taxed more heavily as a result of the tax on saving

Around the world, the EET paradigm has often been preferred over the TEE approach for four reasons. First, the government shares the investment risk: a higher than normal lifetime return generates additional benefits which are taxed under an EET structure; conversely, the tax on benefits generated by a lower than normal lifetime return is taxed less. Second, the progressive income tax rate schedule applied at the benefit stage allows *ex post* equity, since taxation is then calibrated to the value of benefits, rather than the value of contributions. Third, contributions made by employers represent a cost of earning income and are tax-deductible to the firm at the point of contribution. An EET regime means that equivalent treatment is automatically accorded employee contributions. And finally, if, as is widely believed, an aging

demographic will generate additional fiscal stress for governments, the revenue flows from benefits taxation will better match age-related outlays.

B. Policy Options in the Face of Stakeholder Competence and Behavior

A key concern in the pension policy arena has to do with the fact that pension promises are made in the present, but pension payouts are delivered far into the future. Especially given the shortcomings in knowledge, difficulties due to product complexity and cognitive decline, disinterest, and self-control challenges documented above, pension plan fiduciaries must exert careful governance oversight, keeping participants' best interests in mind. Yet in many countries, employers and active employees have not done so, leading to undersaving, excessive fees, overconcentration of risky investments, and the failure to convert retirement assets into income streams. This, in turn, has prompted some governments to oversee and intervene in the workplace-linked pension arena (Campbell et al. 2011).

Perhaps unsurprisingly, a well thought-out and comprehensive approach to the future role of pensions, along with its policy implications, has yet to be developed. Perhaps the most popular policy has been defaults. For instance, in 2008 the UK set up automatic enrollment for savers in occupational pensions. Additional proposals have included recommendations to make auto-enrollment work even better, including changes to eligibility thresholds, portability, and flexibility around re-enrollment (Johnson et al. 2010). In Australia, a policy task force reviewing the country's mandatory superannuation system proposed that each fund develop a default investment portfolio, in the context of compulsory enrollment for all employees, and a minimum contribution as a percentage of wages (Government of Australia 2010). Figure 5 shows how countries with mandated (or quasi-mandated) DC plans position themselves regarding choice. Here minimum contributions are mandatory, since without such a stipulation, mandatory

enrollment would be meaningless. In practice, there is considerable variation in the extent of suggestion and persuasion with regard to fund allocation, choice of provider, and benefit form. Interestingly, none of these countries promotes taking advice through a default setting.

Figure 5 here

When it comes to pension payouts at retirement, practice varies widely. Some countries require no guidance for retirees, while others mandate income payouts. Thus, for instance, Australia has no mandatory payout requirement, while Chile mandates that retirees choose between annuitization and phased withdrawal.¹⁰ Singapore has instituted required deferred annuities from its national DC scheme, with very little leakage in the form of cash-outs (Fong et al. 2011). The US has just issued wide-reaching new regulations governing the process by which financial advisors can encourage retirees to roll their workplace-linked pensions to private accounts (Barbash et al. 2016).

Why defaults are so little used in the domain of retirement income choice is unclear. Some firms may not wish to continue as fiduciaries for long into ex-workers' retirement periods, and some retirees no doubt want uncomplicated access to their accumulations. Moreover, a one-size-fits-all defaults may be mis-calibrated to very heterogeneous retirees. Currently, the Australian model permits defaults to be determined on an individual basis, taking wealth, salary, age, and other information held by the pension fund into account. Auto-enrollment, auto-investment, auto-escalation of contributions, and auto-annuitization, are all possible design settings, suggesting that well-structured DC plans could likely contribute to workforce management. In fact Sunstein (2013) distinguished between passive defaults, active choice, and personalized defaults where individual circumstances could be taken into account. The last category may be a long-term

¹⁰ The US is not included in this selection of countries since the default under employer-sponsored DC plans is a lump sum.

direction for pension policy, especially given the power of big data in generating participant profiles (Blakely 2015).

C. Longevity Insurance Products

While traditional DB retirement plans provided protection against both investment and longevity risk, by paying out benefits as annuities, relatively few DC plans have done so to date. And very few individuals have done so on their own, as in the present low interest rate environment, annuitization is unattractive to many (Mitchell et al. 2011). Nevertheless researchers have recently studied how target longevity insurance can help retirees mitigate the risk of outliving their assets. Here we focus on two products that may be especially important for Baby Boomers now retiring, as well as older individuals who may have already retired.

Group Self Annuitization. Pooled annuity fund arrangements are a form of retirement income tontine, and these have been studied by numerous analysts including Horneff et al. (2015); Milevsky (2015); and Piggott et al. (2005). These products provide longevity insurance by offering coverage against idiosyncratic longevity risk alone; in turn, systematic risk for a given cohort is borne by annuitants. Policyholders pay premiums and receive annuity income streams that depend both on investment returns and the realized mortality experience of all who constitute the insurance pool. The capital left by retirees who die (and consequently exit the pool) is redistributed to the remaining participants as mortality credits.

Also known as group self annuitization plans (GSAs), these products tend to be more affordable than regular annuities because they allow the key risk of living too long to be allocated efficiently. That is, many retirees will be concerned about idiosyncratic risk while the opposite is true for annuity providers. In participating plans, wherein shareholders bear both longevity risk and capital market fluctuations, the insurers avoid having to hold huge capital

reserves as they do not guarantee payouts. In Australia such a product is already on offer, though pension funds having no insurer license can also offer them. In the US, the main provider is the TIAA insurance firm (Horneff et al. 2015), and participating annuities are common in Europe (Maurer and Somova, 2009; Maurer et al. 2012). As with other conventional annuity products, however, the appeal of GSA products can be diminished by loss aversion – that is, people believe they will ‘lose out’ if they die early—as well as bequest motives and product complexity (Qiao and Minney 2015).

Ruin-Contingent Life Annuities. A second type of longevity protection product has been called a “Ruin-Contingent Life Annuity” (RCLA). These can be issued by insurers that protect policyholders against two separate and likely independent events: below-average investment returns, and above-average longevity (Huang et al. 2012). The RCLA invests in a portfolio of assets agreed on by both insurers and annuitants, and the payouts depend on investment as well as survival outcomes. Moreover, a minimum annuity payment is guaranteed by the insurer even if the portfolio becomes valueless.¹¹

Although the RCLA has not yet been rolled out to the marketplace in its pure form, as far as we are aware, similar ideas are embedded in variable annuities having guaranteed living benefits (GLIB’s; Huang et al. 2009). In our view there is considerable scope for research leading to the development of additional innovative products along these lines, which may provide market solutions to the low level of private longevity protection currently observed around the world.

D. Guarantees in Workplace-Linked Pension Systems

¹¹ In the US, deferred variable annuities are supervised by the Financial Industry Regulatory Authority to ensure that investors are protected and broker-dealers comply with the supervisory regulations (FINRA 2007). In the UK, these are to be jointly regulated by the PRA and FCA.

Because pensions are inherently long-term contracts, and firms as well as employees are often short-term focused, this frequently gives rise to a call for government intervention and regulation regarding pension investments and payouts. In countries where pension contributions are mandated (or nearly so), governments have tended to intervene more in capital market outcomes, often in the form of guarantees (e.g., Davis 1998). Yet the nature of the guarantees and what is guaranteed varies widely. For instance, investment returns are guaranteed in Switzerland, where fund managers must provide a minimum pre-specified yield on investments. In contrast, Chile requires that pension managers guarantee a minimum rate of return relative to other pension funds' performance.

What is often not recognized, however, is that guarantees are not free – even when the government provides the backing. The cost of course will depend on exactly what is guaranteed, the volatility of the risk being covered, and the duration of the guarantee. Using a contingent claims approach to value guarantees, it has been shown that promising to pay policyholders a risk-free 2% real return can cost about 29% of each contribution, while a 3% real guarantee costs 46% of each contribution (Lachance and Mitchell 2003). Costs can be reduced low by making more modest promises, and by encouraging, or facilitating, better matching in the pension portfolio between assets and liabilities. Government debt issues can help in this: long duration inflation-indexed bonds, for example, can support long term inflation insurance. Guarantees can also be offered with a deductible. An example is the Australian Age Pension, which is a means-tested non-contributory pension available to everyone satisfying age and residency requirements, whose retirement assets and income fall below certain thresholds.

DB plans in some countries have also been backstopped by government guarantees. For instance the US Pension Benefit Guaranty Corporation (PBGC) was established to partially

protect private sector DB participants in the event of their employer's bankruptcy combined with pension underfunding. The organization is not backed by full faith and credit of the federal government, relying instead on insurance premiums paid by DB sponsors, assets from defined benefit plans taken under PBGC trusteeship, asset recovery from bankrupt companies, and investment income on PBGC assets. Unfortunately a large number of claims combined with too-low insurance premiums left the program facing near-term insolvency for its multi-employer program along with substantial shortfalls for the single employer plans. Its 2015 report cited an overall \$76 billion in underfunding to date, along with another \$248 billion in 'reasonably possible' additional exposures (PBGC 2016). How the DB system will deal with this immense problem is a topic of active debate in the US and likely to remain one for some time to come.¹²

The UK Pension Protection Fund (PPF 2014/5) was established in 2004, also to protect employees whose employers became insolvent with an underfunded DB plan. The PPF was designed to operate based on an annual levy from eligible pension schemes, as well as the assets from schemes for which it assumed responsibility. While its annual levy was designed to be risk-based, McCarthy and Neuberger (2005) have noted that high-risk employers who are most likely to be insolvent are unlikely to pay the extra premium. While the most recent annual indicates 115% funding, the fact that many UK defined benefit plans have been frozen or terminated suggests that collecting the requisite levies may be problematic in the future.

Notwithstanding the cost of pension guarantees, calls for such protection are persistent. For example, Rocha et al. (2011: 15) suggested that the "introduction of government guarantee schemes covering all types of retirement products merits serious consideration." While the potential cost of such guarantees can be estimated and used to determine risk-based premiums on

¹² Several perspectives on how to better model risks facing the PBGC appear in a special issue of the *Journal of Pension Economics and Finance*; see Mitchell (2015).

annuity providers, the question remains as to whether workers and retirees will wish to pay for these. In any event, how guarantees can be used to strengthen workplace-linked pensions is a topic in need of further research.

E. Alternative Pension Administrative and Governance Structures

In recent years there has been much debate about how to organize and manage workplace-linked retirement plans. The conventional model in much of Europe and the U.K. has been traditionally been occupational pensions, where several employers participate in collectively-run programs to benefit their employees (OECD 2014). In Australia, employer superannuation funds may participate in so-called Master Trusts, with a single corporate management offering a range of investment options. There are also multi-employer or Industry Funds, usually concentrated in specific (unionized) industries. In the US, corporate plan sponsors often select individual fund managers to manage their employees' retirement accounts; in a few sectors such as higher education, the nationally-chartered Teachers Insurance Annuity Association manages participant money across a number of employers around the country. And while 40 years ago most corporate DB plans were managed for sponsors' behalf by insurance companies, this model applies to few plans today. US public sector plans tend to have dedicated boards (often consisting of political appointees) who select and supervise private money managers.

Given the range of organizational structures around the world to manage workplace-linked pensions, substantial research has been devoted to determine which model might be most efficient and well-run. Ambachtsheer (2016) is perhaps one of the most vocal critic of pension systems across the board for being too expensive and too short-term focused, and DB plans for failing to match assets with liability streams. The extent to which pension funds do experience

scale economies has been heavily debated for years: Broeders et al. (2015) concluded that there was in the Dutch context; Bateman and Mitchell (2004) agreed in the Australian context; and the ICI (2014) concurred for the US.

Another topic that continues to receive research attention is the political economy of pension governance. The evidence suggests that board composition can influence investment and funding patterns (Mitchell and Hsin 1997; Useem and Mitchell 2000). In a comparative study of public pensions with sovereign wealth and country reserve funds, the authors focused on protocols and practices regarding fund governance, accountability, and investment policies (Mitchell et al. 2008). They found that higher old-age ratios were associated with better pension plan governance around the world.

An outstanding question for the future is whether retirement saving plans of the future will continue to be tightly linked to the workplace. As we have noted above, retirement plan participation is higher at firms which provide automatic enrollment and escalation in their company pensions, as well as default investment allocations. And the ease of automatic payroll deductions, as well potential scale economies in investment and plan communication, are points in favor of the workplace-based pension arrangement (Tang et al. 2010). Yet there is also evidence that those who default can end up with lower average contribution rates, as recently noted by Vanguard (2016).¹³ And participants who select target-date funds when they are first offered also have notable portfolio changes, suggesting that employees view these funds as a form of implicit investment advice provided by employers (Mitchell and Utkus 2012). When and whether such advice is in participants' best interest is a topic of ongoing research (Kim et al. 2016).

¹³ The report stated that “aggregate contribution rates have also declined slightly from 2007...because of the impact of low default contributions for automatic enrollment” (Vanguard 2016: 5)

Partly in response to these concerns, and partly acknowledging the fact that many who might like to save for retirement have no workplace pensions, there has recently been a push to delink pension saving from employers. In the US, for instance, cities, states, and the Federal government are working on new models that would provide workers with access to government-run pensions without requiring employers to take on the fiduciary and administrative burdens (c.f., Gale and John 2016; Iwry and John 2009). These new models face legal and regulatory obstacles, of course, and it remains to be seen how cost-effective the new approaches will be (GAO 2015).

F. Interim Conclusions

Government policy and regulation play a large role in workplace-linked pension provision around the world. But in developed nations, where workers are more likely to be able to afford to set money aside for old age, this source of retirement financing is receiving renewed attention in the wake of population aging. In turn, this has put new emphasis on associated policy structures. Figure 6 gives an indication of how policymakers across several countries have chosen to harness workplace-linked pensions to deliver retirement incomes, and the associated importance of these pensions in delivering retirement security. There is no policy consensus on what the new roles for pension may be, but reliance on publicly-financed Social Security programs will likely be alleviated when pension plans are strengthened.

Figure 6 here

Our review of relevant policies toward pensions identified four key elements. First, many countries provide a break for pension saving relative to traditional income taxation, which can provide a major rationale for workplace-linked plans. Second, workplace pensions can add value in light of limited consumer financial knowledge and biases in behavior. Some of these problems

can be dealt with by products that offer longevity insurance. Third, various problems result from policymaker efforts to support retirement products with guarantees. And fourth, administrative and governance structures can either enhance or detract from the efficacy of employee saving.

V. Overall Conclusions and Research Needs

This chapter has shown that population aging as well as other factors generate direct threats to traditional Social Security PAYGO models of retirement provision. Growing numbers of elderly and declines in the relative size of younger workers make it difficult to boost contribution rates and threaten cuts in promised benefits along with a burgeoning legacy debt. Inevitably, workplace-linked pensions will be asked to play a more prominent role in retirement financing, as attested to in countries mandating such provision and employers offering these arrangements. Yet changes in global labor and capital markets are altering firm motivations to offer these pensions, as well as their appeal to employees. In turn, these trends are challenging government efforts to support traditional pensions in the workplace. DB plans have given way to DC plans in many countries, and technological advances as well as the deployment of big data will continue to change pensions in tandem.

Many new research questions are emerging from this evolutionary process. Employees today face the responsibility to figure out how much to save, how to invest, and in retirement, how to spend down their retirement wealth. The fact that plan sponsors are loath to provide advice on such topics has motivated much research around consumer decision-making, the role of defaults, and the role of financial knowledge and literacy. The same changes also raise questions about whether employers of the future will still value pensions for their human resource management leverage.

As a result, the future roles of workplace pensions will vary across countries, industries, and worker types. New research can help smooth this process as it explores the feasibility, consequences, and implementation challenges of various workplace-linked pension designs. For instance, in light of the aging demographic, pensions that allow gradual transitions to retirement could be of value. Additional topics requiring investigation could include contributions that adjust to retirement accumulations late in the work life, and retirement age increases. Naturally this analysis must be coordinated with attention to other risks and policies such as Social Security taxes and benefits, and disability and healthcare insurance.

Relatedly, the role of financial knowledge in decision-making by individuals, households and families about saving and investing for retirement, and payout products, is a rapidly-developing field. Research on the link between financial knowledge and literacy, defaults, and outcomes is still in its infancy, but its findings are crucial to understanding what workplace pension designs might be most efficacious. And finally, affordable retirement financial products, especially products providing longevity insurance, have proved difficult to design, and further research is needed to generate a knowledge platform from which a new generation of products might be launched. These products have a central role in a retirement finance environment dominated by DC plans.

More specifically, we believe that some of the most exciting examples of research needs in the field, particularly relevant to the aging demographic, include the following topics:

- **Plan design:** including enrolment; contribution rates (for both employers and employees) and investment design; payout design (including access ages, guarantees and lump sums); administrative costs and governance; and asset/liability management;

- **Choice and decision-making:** including research that accounts for peer effects and workers' social context; the role and incentive-compatibility of advice; and possible roles for big data in setting up personalized and dynamic default portfolios;
- **Financial knowledge and literacy:** including natural and lab experiments with state of the art random assignment, and longer-term follow-ups than have been feasible to date;
- **Guarantees:** including on returns, benefit levels, replacement rates; also attention to costs, benefits, incidence, incentive effects, and interactions with publicly-funded retirement provision.

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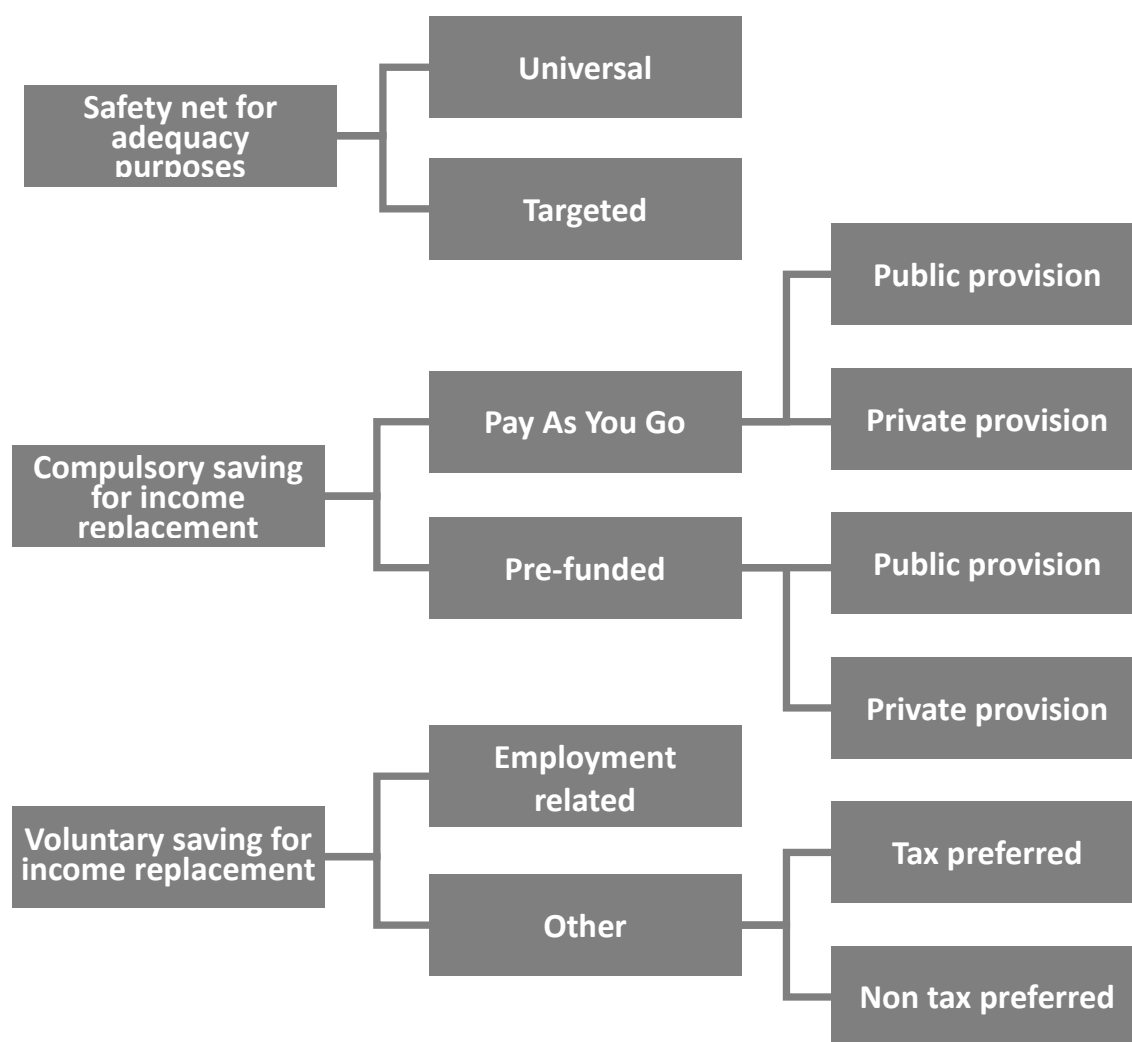
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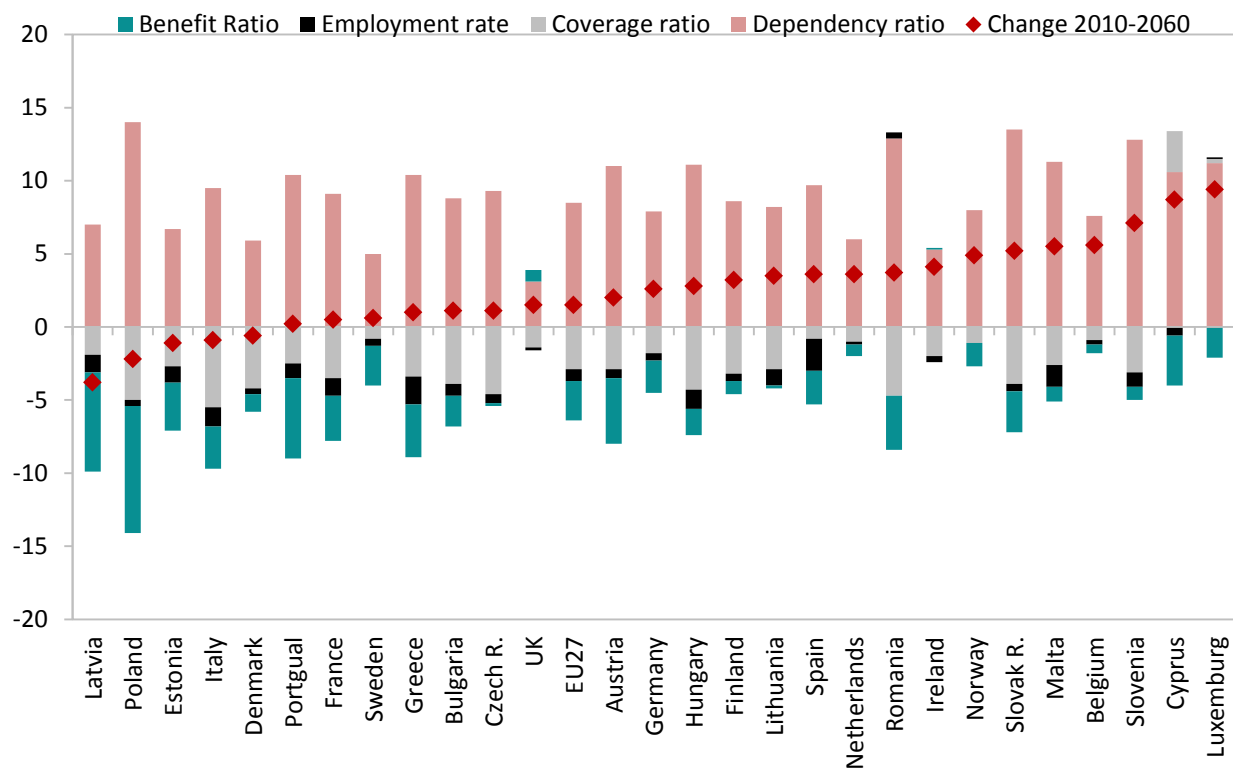
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Figure 1: Pension Design Options

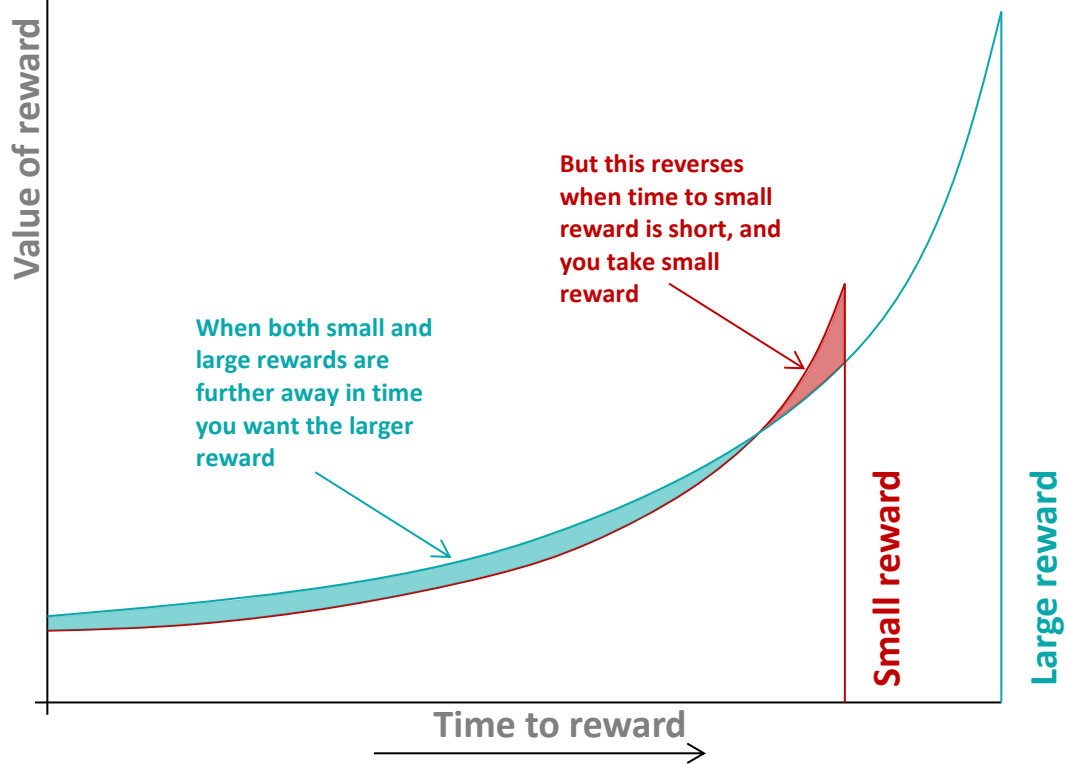
Source: Authors' construction

Figure 2: Decomposition of Gross Pension Expenditure Change: 2010-2060 (in p.p. of GDP)

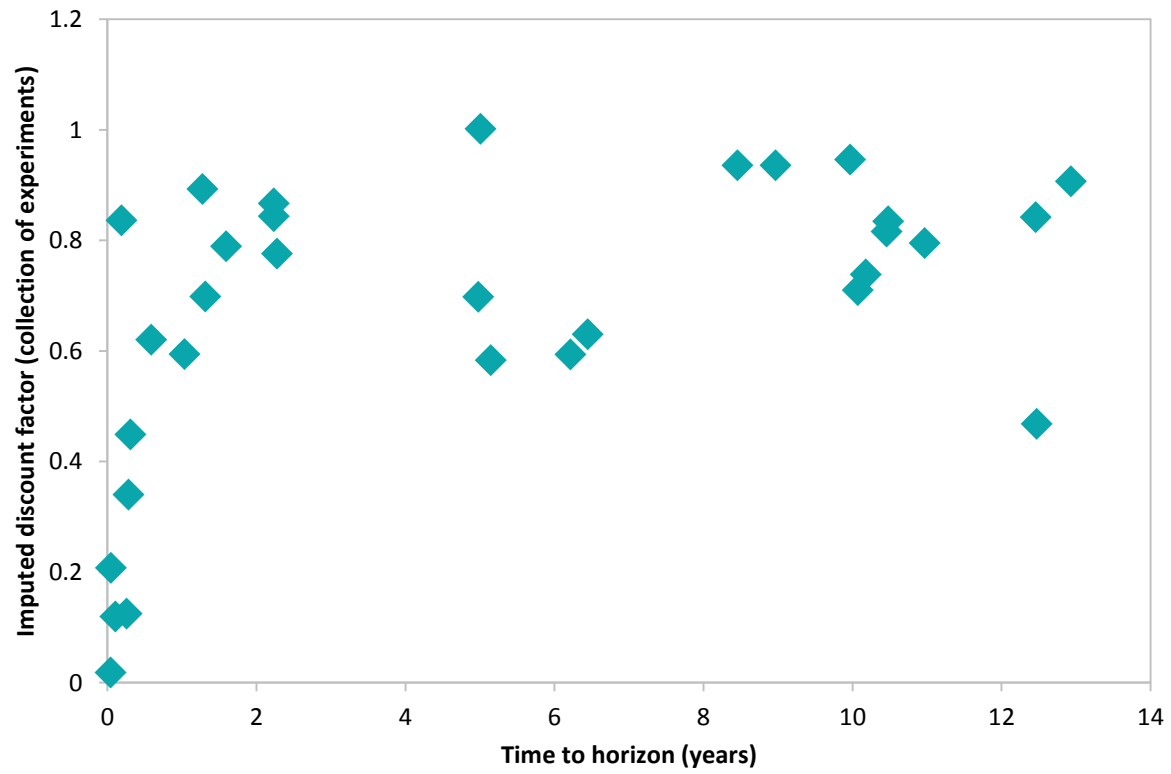


Source: Authors' analysis of European Commission (2012), Table 2.10

Figure 3: Dynamic Inconsistency in Preferences



Source: Adapted from Green et al. (1994)

Figure 4: Dynamic Inconsistency in Preferences: Empirical Results

Source: Frederick et al. (2002)

Figure 5. Domains of Choice in Mandatory and Quasi-mandatory DC Pension Schemes

	No soft or hard compulsion ^a	Default	Tax preference only	Mandated / highly restricted choice ^b
Enrollment				AUS, CHI, DNK (ATP), DNK (OCCUP), EST, HUN, ISR, MEX, NOR ⁸ , POL, SVK, SWE (PPM)
Contribution				AUS, CHI, DNK (ATP), DNK (OCCUP), EST, HUN, ISR, MEX, NOR, POL, SVK, SWE (PPM)
Allocation	SVK	AUS, CHI, DNK (Occup.) ³ , MEX, EST, HUN, NOR, SWE (PPM)		DNK (ATP), ISR, POL
Provider	CHI, EST, SVK	AUS, POL, MEX, ISR		DNK (ATP), DNK (Occup.), HUN, NOR, SWE (PPM)
Advice	AUS, CHI, DNK (ATP), DNK (OCCUP), EST, HUN, ISR, MEX, NOR ¹ , POL, SVK, SWE (PPM)			
Retirement phase	CHI ¹ , MEX ⁶			AUS, DNK (ATP), DNK (OCCUP), EST, HUN, ISR, NOR, POL, SVK, SWE (PPM)
Benefit	AUS, DNK (Occup.) ³ , CHI, MEX ⁷ , SVK ⁹			DNK (ATP), EST ⁴ , HUN, ISR ⁵ , NOR ⁴ , POL, SWE (PPM)

Note: Includes mandatory or quasi-mandatory (i.e. based on broad IR contracts such as in DNK), 11 countries: AUS, CHI, DNK (ATP), DNK (OCCUP), EST, HUN, ISR, MEX, NOR, POL, SVK, SWE (PPM) {SWE also has occupational pensions which are either DC or DB}. Excludes voluntary DC even where they have ‘broad coverage’ {OECD definition}: BEL, CAN, CZR,

DEU, IRL, NZL, NOR (voluntary), GBR, USA. Some countries have default allocation as well as mandated max/min restrictions by asset class for those choosing.

^a Only actuarial adjustment

^b For retirement decisions, the existence of a minimum age represents a mandated choice... but then are such schemes pensions at all? What would we otherwise define as mandated or not?

Specific Notes

¹ Requires a DC benefit of at least 80% of the maximum targeted benefit and a replacement rate of at least 70%

² Tax incentive to delay until 60 until 2024, then mandated to no earlier than 60

³ Choice with respect to allocation and benefit can differ by scheme

⁴ Choice among types of annuities

⁵ Once an annuity is purchased up to a certain level, left over funds can be taken as lump sum

⁶ Members may retire at any age if the accumulated capital in their account allows them to buy an annuity that is at least 30% higher than the minimum guaranteed pension. In this case, the member does not have to complete the 1 250 weeks of contributions

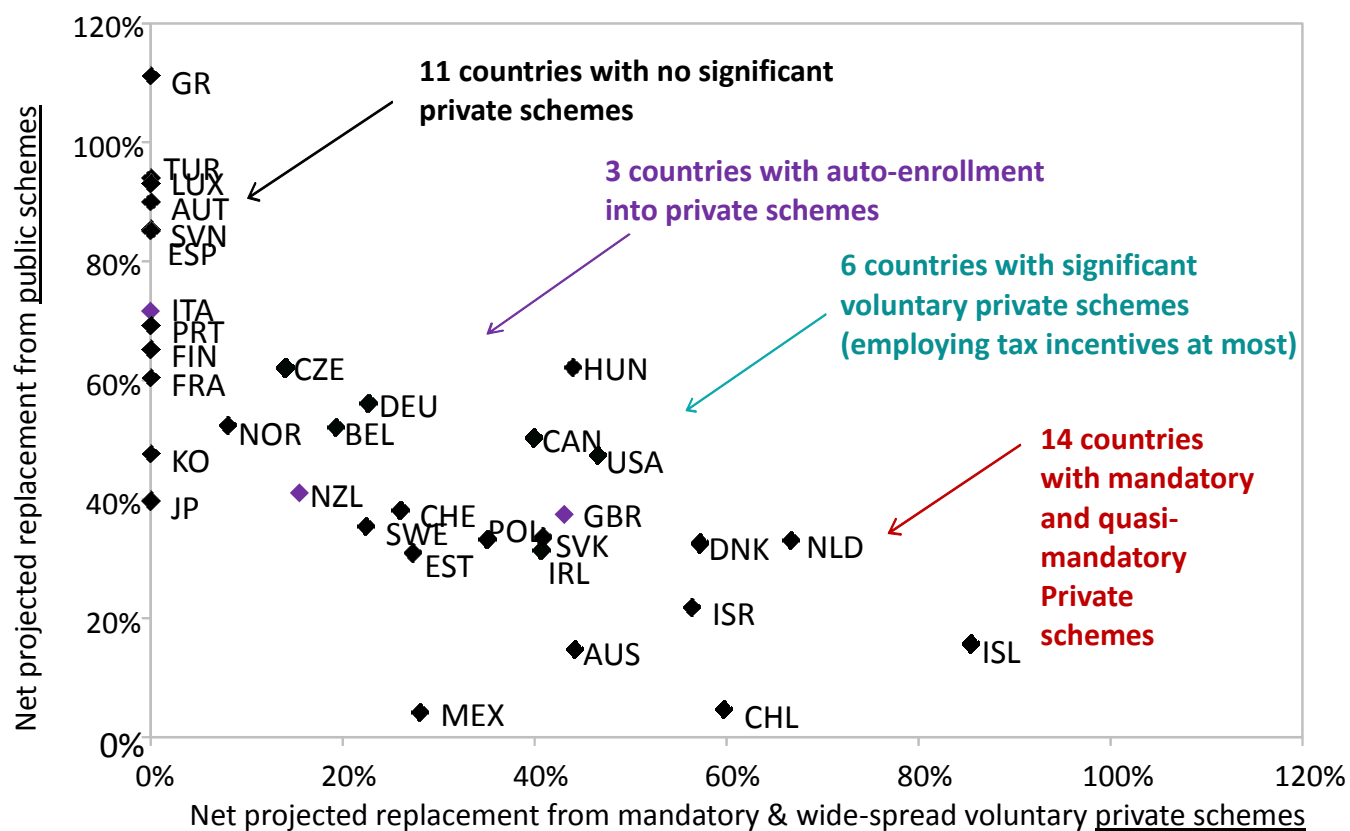
⁷ Choice is between phased withdrawal or annuity. Lump sum can be taken only if 1 250 weeks of contributions is not reached.

⁸ Employer must pay minimum contribution; employee may contribute but does not have to

⁹ Annuity or phased withdrawal. No lump sum.

Sources: Anderson and Skjodt (2007); Antolin et al. (2009); Milev and Nenovsky (2012); OECD (2008, 2011a, 2011b, 2012a); 2012b); Rozinka and Tapia (2007); Rusconi (2008); Trampusch et al. (2010); and Tupy (2006).

Figure 6: Retirement Income Policy Options and the Private-Public Financing Mix



Source: OECD (2011b)