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# **Principles in the Design of an Optimal Retirement Income Security System**

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## Motivation

One need look no further than France to realize what a hot topic retirement income security is. It is also the case that many countries, such as Cyprus, Ireland and Germany, are now looking at reforms to their social security systems because of sharply increasing aged dependency ratios (European Union 2021). They are looking at wide-reaching reforms, not just an increase in the age of eligibility.

We also have examples of countries in eastern Europe, mostly ex-Social Soviet Republics, that have wandered back and forth between pay-as-you-go (PAYG) systems and fully funded individual account systems (the latter with external pressure from the World Bank). Workers have suffered in these meanderings (Altiparmakov, 2018a and b).

On the private-sector side of retirement income security, we have the post-war baby-boom generation entering retirement in droves. They have saved for retirement either through workplace plans or in capital accumulation plans. The vast majority of their retirement security rests in defined contribution arrangements, whether at work or through individual accounts. Yes, many workers have assets, but they have no idea how to use those assets so that they do not run out of income years before they pass away. We need to have a system for them where they can share the life expectancy risk.

We provide answers for them in this paper in the form of pooled asset target benefit risk shared plans where benefits can go up but can also go down depending on investment returns and realized (versus expected) life expectancy. In some jurisdictions, these are called collective or commingled shared risk plans. MacDonald et al. (2021) refer to these as dynamic pension pools.

## Introduction

Optimal design criteria must:

- be affordable;
- provide adequate benefits to the poor and consumption smoothing to all;
- achieve some level of equity in the ratio of benefits to contributions;
- be progressive;
- not create perverse incentives (stop contributing or stop saving);
- operate efficiently; and
- be understandable.

The relative emphasis that is placed on each criterion depends on the political, economic and demographic context of the given country.

There is no one perfect universal retirement income scheme. The level of economic development, the population age structure and political factors affect the retirement income scheme appropriate for different countries. As the economic, demographic and political situation in a country alters, changes in retirement income schemes may also be required. Because of the interaction between social security retirement benefit schemes and economic development, retirement income schemes evolve over time and different systems may operate more successfully in different countries and at different times.

All countries need to develop pluralistic designs and flexible structures for their social security schemes. To meet the goals of alleviating poverty in old age and providing low-risk retirement benefits, generally multiple sources of benefits are needed ... Retirement income must have an element that is redistributive and it must be provided from diversified sources. The relative importance of the different sources will depend on the rate of return and risk of the different sources. (International Labour Office, 2000)

It is impossible to design a risk-free retirement income security system. Risks can only be spread and shared. For large systems, hedging is difficult, if not impossible.

Further, creating the appearance of hedging of some risks by transferring the risk to the government/taxpayers (e.g., longevity bonds, real return bonds) is hollow since taxpayers and social security/pension participants are one and the same. What one should be striving to achieve is a system that runs at minimum cost with stable contributions and benefits, and that also achieves macroeconomic diversity.

Characteristics of a preferable retirement income security system are stability and sustainability at minimum cost and risk. Risk can be mitigated but not eliminated. Risk mitigation techniques include risk sharing across all plan participants and even across generations (making coverage mandatory would assist in this) and the creation of a widely diversified total retirement income security system. There should be a mix of PAYG and full funding. There should be a mix of defined benefit (DB) plans and defined contribution (DC) plans and a mix of public and private administration. But never should an entire national retirement income security system put all its eggs in one basket. Diversity is strength. Finally, there must be good and transparent governance.

This is a very serious concern today, as many nations are on the road to only one basket, namely, DC, fully funded individual account systems (International Labour Office, 2000). One can find nothing in basic actuarial science axioms to support this approach as optimal.

A basic economic/actuarial tenet is that one way to mitigate risk (variance) is through diversification. That is, one shouldn't put all of their eggs in one basket. This tenet should extend into the design of the total retirement income security system of any country (see Diamond, 2004).

A retirement income security system is really, at its most basic level, a means to determine how much of a country's gross national product (GNP) can be consumed by elderly retirees. There are many ways to do this. While the various designs may appear to be radically different, at their most basic roots, they are highly similar in respect to their macroeconomic impact.

Having seniors with comfortable income levels is good for the entire economy. Those monies get spent on a variety of activities and needs, and the impact is positive for the broader community.

In Holzmann and Hinz (2005), the World Bank states its goals in terms of broad social protection, poverty alleviation and consumption smoothing. To achieve the goals with respect to retirement income, the World Bank proposes a multi-pillar system comprised of some combination of five basic elements:

0. A non-contributory "zero pillar" providing a minimal level of protection.
1. A mandatory "first-pillar," publicly managed system linked in varying degrees to earnings [DB, DC or nominal DC (NDC)], redistributive, providing some longevity insurance financed by intergenerational contributions.
2. A mandatory "second-pillar," fully funded, private asset-management, contributory, that can be constructed in a variety of ways, more likely by individual savings accounts but maybe by DB.
3. A voluntary "third-pillar" funded, regulated, privately managed, flexible and discretionary in nature.
4. An informal intra-family or intergenerational "fourth-pillar" that includes financial and non-financial support to the elderly, including access to health care and housing. The government is not directly involved, although it may create some tax incentives. An example is home care.

Pillar 0 will normally provide defined benefits and be financed on a PAYG basis (e.g., tax revenues). Pillar 1 in most advanced economies is still a DB scheme, although there has been a measurable shift to DC social security retirement systems (SSRSs) over the past 30 years. If DB, these plans are normally only partially funded (but not pure PAYG).

Similarly, employer-sponsored pension plans 30 years ago would have been primarily DB plans but are now mostly DC. In either case, they are meant to be fully funded at any time. Finally, individual savings are purely DC schemes and are fully funded, by definition.

There are times when PAYG is favourable and times when full funding is to be preferred. Similarly, there are economic conditions that favour DB systems and other environments that favour DC.

## Pillar 0

An optimal SSRS should include in its total benefit package a minimum benefit that is enough to provide economic security to the elderly at least equal to an accepted measure of the poverty threshold. That is, an acceptable SSRS will create at least subsistence level benefits.

One also needs to be wary of providing significant minimum benefit guarantees in the total package of benefits. Providing them may seem to be consistent with the priority of alleviation of poverty, but doing so brings with it a huge risk of moral hazard. That is, if workers (and employers) know that by achieving a minimal hurdle one can achieve enough benefits to avoid poverty, many workers (abetted by their employers) will just achieve that hurdle and not one millimeter more. This will mean that the system will pay benefits for which there are not equivalent contributions. At the least, Pillar 0 benefits should be minimalist (only alleviate poverty) and come from a program financed from general tax revenues, not social security contributions (i.e., PAYG).

### Minimum benefits: demogrant or welfare

(In a demogrant system, benefits are paid to those who satisfy a residency criterion. There are no other requirements.)

The question now arises as to whether Pillar 0 should be paid as a demogrant or welfare benefit. The difference is whether or not there is an income and/or asset test for the Pillar 0 benefit that will result in the benefits being clawed back for many recipients [i.e., recipients lose their SSRS benefit according to the amount of personal income they have. These clawback rates can be quite high (e.g., 50%)].

Such clawbacks can cause perverse actions by the SSRS participants. For example, this can create incentives that work against private saving on the part of workers. Or, if a lump sum payment of non-Pillar 0 retirement savings is allowed, workers may cash out their SSRS benefits at retirement and spend this cash quickly to qualify for the Pillar 0 benefit. Clearly, this is not desirable.



#### Public policy implications

**An optimal SSRS should include in its total benefit package a minimum benefit that is enough to provide economic security to the elderly at least equal to an accepted measure of the poverty threshold.**

## Pillar 1

### Introduction

Pillar 1 is an earnings-related, publicly managed layer financed by contributions and, perhaps, some investment income.

### Pay-as-you-go versus fuller funding

First, we need to define some terms. PAYG will refer to plans that have no or very little pre-funding, or where all assets are government bonds of the national government. These plans should have enough in reserves to outlive a short-term crisis (e.g., two years' worth of expenditures). Full funding will refer to plans that are very highly pre-funded in assets beyond just bonds of the national government.

It is the position of this paper that the financing of any social security scheme is of secondary importance. This is based on another fundamental belief that social security should not be thought of as a big private pension plan, but rather as a wealth transfer scheme.

Under PAYG financing, the required contribution rate,  $C = \frac{P_t}{A_t} * \frac{B_t}{AIW_t}$

where:  $P_t$  = The number of pensioners

$A_t$  = The number of active workers (in the formal sector, from whom contributions can be expected)

$B_t$  = The average pension benefit

$AIW_t$  = The average wage upon which contributions are made

This can be viewed as being the product of the aged dependency ratio and the financial replacement ratio. For example, in a country that tries to replace 39% of income through social security benefits for the average worker, and where the aged dependency ratio is 0.33, the contribution rate will be 13%. (This, in total, approximates the US reality quite closely.) For a fuller discussion, see Brown, 1997, Barr, 2000, and Conesa and Garriga, 2004.

We would argue that there is little macroeconomic difference between a PAYG SSRS and one that is funded and where the assets are all government bonds (especially if the net cash flows of the SSRS are included in a unified government budget). Those who pay SSRS contributions are the same people as those who pay off the debt represented by government bonds. What is the difference between paying higher SSRS contributions or taxpayers paying to redeem government bonds? They are surely the same in both size and timing.

Further, in the discussion of whether or not we prefer pre-funded systems versus PAYG, we would submit that the primary goals of an optimal system are risk sharing and system sustainability and stability along with minimal cost. A stable rate distributes costs more equally across generations, especially in the context of an aging population. Maintaining a stable contribution rate promotes greater confidence in the scheme from the public. So we must analyze which method of financing offers the most risk sharing (and appropriate assumption of responsibilities) and which system results in the most sustainable and stable outcome at minimal cost. We will review one method of helping to have a stable rate later in the paper (Moving the age of eligibility).

Further, in this discussion, we must operate on a wider spectrum than just the SSRS. We need to include other methods that the country offers to provide retirement income security.

For example, most countries provide a Pillar 0 minimum guarantee of benefits, which is normally a welfare system, funded by general tax revenues. At the other end of the spectrum, most countries will provide tax incentives (or legislation mandating coverage) for employers to provide employer sponsored pension plans or for individuals to save for retirement in tax incented schemes. The latter are usually fully funded schemes (even though at certain moments some employer sponsored DB plans may not achieve full funding).

Thus, we already have a mix of PAYG and full funding in our total system. This is good. There are times when PAYG is preferable and full funding is not, but also times when full funding is to be preferred (Brown, 1997).

The fuller the funding of one's SSRS, the more dependent one becomes on the investment cash flows and thus on rates of return. Thus, the apparent contribution rate required to "fund" the plan will rise and fall with investment returns, which can be very volatile. Obviously, this is not true of PAYG plans unless the working population declines significantly so that the number of contributors to the system actually falls. Thus, while fuller-funded plans may mitigate the demographic risk, fuller funding brings more economic risk (such as was felt in 2008-09). Thompson (1998) contends that historical evidence suggests that sensitivity to economic changes is likely to be a more serious source of unpredictability than sensitivity to changes in population demographics. What one wants is long-term stability and sustainability at a minimum cost. A fuller-funded SSRS may not create this outcome.

Further, if a large number of SSRSs in the world were designed to be fully funded, there would not be enough global assets available to cover the demand by only these systems. In many countries, the investable funds could exceed the annual GDP of the nation.



Pre-funding may enhance growth in and development of the economy through the development of the infrastructure of the country (schools, roads) and through the creation of strong financial institutions (banks and stock markets).

To be beneficial, any level of pre-funding must lead to an increase in national savings and ultimately in economic output to supply the goods and services consumed by future retirees.

Further, an SSRS should account for the impact of its provisions, most notably those influencing the labour market, on future economic output and incorporate means to contribute to its growth.

PAYG plans do expose the system to demographic risk more than do fuller-funded plans. But full funding does not fully immunize a system from demographic risk. At the extreme, if there is no labour force as the result of demographic shifts, then there will be no production of goods and services and no ability for the elderly to share in any production.

The demographic volatility inherent in PAYG plans is normally predictable well ahead of its impact so that some forms of mitigation are possible. For example, if the labour force is in decline because of low fertility rates, a country can respond by providing incentives for more births [these are usually only temporarily or marginally successful (see, for example, Hohn, 1987)], or it can increase net immigration (these immigrants should be labour-force ready) or increase labour force participation rates, especially among females (it may be difficult to do this in some cultures).

Within the mathematics of social security, one can show that PAYG SSRS is to be preferred when the contributory earnings within the system are rising at a faster rate than the rate of return on investments. Conversely, fuller funding is to be preferred when the rate of return on investments exceeds the growth rate of contributory earnings (Aaron, 1966).

But this choice must be within a broader system of providing for retirement income security than just the SSRS.

We repeat that many countries have Pillar 0 benefits that are PAYG and Pillar 2 and/or Pillar 3 benefits that are fully funded. Thus, we should decide on the funding options available to the SSRS only in the context of the funding choices of the other segments used to provide retirement income security. This often results in partial funding being the optimal outcome for the SSRS (Office of the Chief Actuary, 2007).

We would anticipate that all private pension plans are meant to be fully funded at any moment because the sponsoring companies can cease to exist.

A good SSRS will have relatively stable contributions and benefits. It will also fit nicely into a nation's overall retirement income security system and provide macroeconomic diversity.

An SSRS is NOT a large pension plan. Considering it as such leads to many invalid and false conclusions. The essence of social security is much more basic than it being a large pension plan.

Workers produce goods and services. In total, for any country, they produce GNP. Once the products are produced, they are available to be consumed by the country's population (or traded in exchange for consumable products from another country).

In bygone periods, workers would trade real products with specialized producers of other products (a cotton shirt for a chicken). We no longer use this direct barter system. Rather, we pay workers money that they can then use to buy the goods and services they desire.

So workers are both producers and consumers of goods and services. However, the entire population of any country expects to be able to consume a share of the GNP of that country. The entire population expects, at the least, a minimal provision of food, clothing and shelter.

There are many ways to make this allocation of GNP work.

In a pure socialist state, the government can allocate the supply of food, clothing and shelter to all citizens. In a pure capitalist system, workers will have money to buy the essentials for themselves and their dependents (which may include both children and elderly dependents).



Neither of these “pure” systems exists in any advanced economy today. All modern economies are a mixture of responsibilities that fall to the government or are the responsibilities of the private citizen or employer.

However, the ultimate responsibility for society’s ability to consume goods and services comes solely from the producers of these same goods and services. If no GNP is produced, there will be no consumption. Wealth must be created before it can be distributed.

There is little real difference in these systems at a macroeconomic level, except, perhaps, for the ability of the system to redistribute wealth. Today, workers produce goods and services. For this they are paid money. They then use this money to buy the goods and services they desire. Money, in and of itself, has virtually no value. It cannot be eaten. It cannot be burned for heat. It cannot be made into clothing. It is only a means of exchange.

In most modern societies, education for children and health care for the entire population is a government responsibility. However, the cost of these responsibilities is paid by workers in the form of taxes and fees (the revenue of the government). In some countries, these basic provisions remain the responsibility of the individual worker, who pays for these services for both themselves and for any dependents (again, both children and elderly).

This then leads us to the provision of retirement income security. By creating systems for the provision of retirement income security, society decides how much of the GNP can be consumed by elderly dependents.

Again, there are myriad models that can be used to produce this outcome. A country can have a massive SSRS that provides its elderly with all the income they need to be able to purchase an acceptable level of consumption of goods and services.

Or the provision of retirement income security can be left 100% to the individual. That is, individuals must provide for the ability to continue to consume after exiting the labour force by saving funds in their working lifetimes. As pointed out elsewhere, this is a very difficult task for an individual to achieve. Further, some individuals are myopic, which is why some government involvement or mandates are preferred.

For example, some European countries have SSRSs where the benefits are large enough that private saving is hardly necessary. At the other extreme, a country whose SSRS is an individual account system (e.g., most of Latin America) really leaves virtually all of the responsibility for retirement income security to the individual worker (Arenas de Mesa, 1997).

But at the macroeconomic level, there is actually very little difference in terms of the ultimate outcome in these remarkably different models for the provision of retirement income security.

For example, assume that a country has a relatively massive SSRS that requires workers to contribute 20% of their wages to the system. This is equivalent to saying that a worker gives up the rights to one day of production (out of five), which is then available for the elderly to consume.

Or, in a private system, it may be necessary for a worker to save 20% of wages to provide privately for their own retirement income. Thus, the worker does not consume one day’s production, but instead saves the money paid for one day of production. Ultimately, these savings are invested (directly or indirectly) in assets like stocks and bonds. While there need not be a direct connection to an elderly dependent, still, one can see that a major source of the supply of such assets would be the previous generation of workers (now retired) who have a cache of stocks and bonds that they must turn into cash to be able to buy goods and services. Thus, we again see the transfer of one day’s output to the elderly for their consumption. Clearly, workers need to be producing enough GDP to buy their assets.

At the level of the individual (the microeconomic level), these systems are radically different and have hugely different outcomes depending on shifts in demographics and economic shocks. However, at a macroeconomic level, the two systems are not very different.

Most SSRSs allow benefits to grow, post-retirement, at the rate of inflation, as measured by an acceptable index. This is normally not a problem since contributions to the system grow with wage growth, and wages normally grow faster than the cost of living (in fact, the end result is a small “discount” factor). Problems occur when inflation exceeds wage growth.

In the Swedish notional contribution system, the pricing assumption for the retirement annuity is a growth rate of 1.6% per annum. If national wages grow faster than 1.6%, then the pension payable is adjusted upward. If, however, wages grow at a rate less than 1.6%, then pensions in pay only increase at the growth rate of the economy. So, again, this risk has been mitigated in terms of the stability and sustainability of the system. However, the risk has been transferred in whole to the pensioner (when they are too old to be able to do anything about it).

It is possible to hedge the inflation risk by backing all retirees' liabilities with real return bonds. However, it is not easy to find real return bonds being offered by the private sector. Thus, the normal provider of real return bonds is the government. Again, if we only transfer risk from participants in a retirement income security system to the taxpayers, have we really changed anything since these two groups are one and the same?



### Public policy implications

**It is the position of this paper that the financing of any social security scheme is of secondary importance. This is based on another fundamental belief that social security should not be thought of as a big private pension plan but, rather, as a wealth transfer scheme.**

## Automatic balancing mechanisms for SSRs

SSRs based on individual accounts do not need automatic balancing mechanisms (ABMs), since the retirement benefit is simply what the workers' account balance can purchase. Thus, by definition, this system is always in "balance," with all risks carried by the individual worker/participant.

Outside of individual accounts, ABMs can greatly assist the stability of social security contributions and benefits, and they can guarantee sustainability. This requires that some risks be shifted to the participants of the system. Unfortunately, the reallocation of this risk is often inappropriate.

Several countries now have ABMs (e.g., Brazil, Sweden, Germany, Italy, Japan and Canada). Of course, one could say that the US Old-Age, Survivors and Disability Insurance (OASDI) system also has an ABM in that once the reserve funds are depleted, benefits have to be reduced to what can be supported in a pure PAYG system (Vidal-Melia et al., 2009)

Unfortunately, all but one of these ABMs rebalance solely by reducing retiree benefits (see Barr & Diamond, 2011). This seems rather unfair since retirees have little recourse to respond (i.e., most cannot return to the labour force). Only the Canadian ABM shares the rebalancing between retirees and workers. In Canada, if the legislated contribution rate is not large enough to sustain the system for 75 years and the politicians do not agree to amendments that bring the system back into balance, then two things happen. First, contributions rise half the distance to what would create rebalance. Second, retiree benefits are frozen (no indexation) for three years or until the system is rebalanced. It has been shown that even this apparent fair sharing of the risk takes more from the retirees than from the workers (Monk & Sass, 2009).

Because the Swedish system is a DC system, contribution rates cannot be adjusted to rebalance the system, because if they are increased, they boomerang to increase the benefit. A DC system (whether funded or PAYG) must assume uninsurable risk by adjusting the pension level. Increasing the contribution rate is not a viable response to a deficit.

Sweden defines a balance ratio as follows:

$$\text{Balance ratio} = \frac{\text{Contribution asset} + \text{Buffer fund}}{\text{Pension liability}}$$

If the balance ratio falls below 1.00, the ABM is activated. It switches the indexation of pensions and notional pension capital to a new index series, called a balance index. The balance index is established by multiplying the normal income index by the balance ratio. While this achieves system stability, once again the burden falls solely on the pensioners as a group and not the active, contributing workers.

Moving one's SSRS to a target benefit scheme will mitigate most of these problems. The benefits available from the system to retirees or people with disabilities will be contingent on the long-term sustainability of the plan at its defined contribution rate. If the plan cannot pay promised benefits over the long term (say 75 years) then there would be two potential impacts. First, contributions could rise. This implies that active, contributing workers are the ones being asked to shoulder the risks of the plan and that there is no impact on beneficiaries.

An alternative is to cut benefits. One way is to de-index adjustments of benefits to the cost of living (i.e., freeze any cost-of-living adjustment). This need only happen until the plan comes back into balance. In fact, if investment returns improve, past "missed" cost-of-living adjustments could be reimbursed so long as long-term sustainability is indicated. If benefit reductions are the unilateral reaction, it means that one would expect beneficiaries to shoulder the entire risk burden. This does not seem to be fair.

What is fair is some combination of these two alternatives that shares the pain between workers and beneficiaries. This alternative exists in the Canada Pension Plan.

If one does not want any political influence, then such a balancing mechanism should be made automatic.

Clearly, a plan that is a target benefit plan or a plan that has an ABM can and should have zero impact on national debt.



### Public policy implications

**Outside of individual accounts, ABMs can greatly assist the stability of social security contributions and benefits, and they can guarantee sustainability. This requires that some risks be shifted away from the macro system to the participants in the system. This risk sharing should involve both workers and beneficiaries.**

**Moving one's SSRS to a target benefit scheme will alleviate and mitigate most of these "balancing" problems.**

## Eligibility for benefits and solidarity

This paper supports fairly long qualifying periods for full SSRS benefits. Some systems require approximately 40 years of contributions for full benefits (e.g., Canada requires 39 years). The US requires 35 years. Others require much shorter periods.

The problem with qualifying for full benefits with very short qualifying periods is the anti-selection that this creates. People will contribute for the shortest period possible to attain full benefits and will then try to avoid contributions by (for example) entering the underground economy (the cash economy).

If one wants special provisions for military service or raising children (for example), one can handle each case by allowing the "drop out" of years that meet defined criteria. Thus, it may be possible for a person who raised children to get full benefits with less than the qualifying period for others. This is a far superior method than providing full benefits to everyone with a very short qualifying period because of the anti-selection the latter creates.

Another goal is "solidarity." That means that all contributors (normally workers and employers) should want to support the SSRS. That is, there should not be a large proportion of workers who do not participate in and benefit from the system. This will mean that there will have to be benefits for wealthy people even if that may seem otherwise unnecessary.

To the extent possible, the SSRS should not create perverse economic incentives. These include incentives to stay out of the formal economy (and pay taxes and social security contributions) and enter the cash economy. That means that the total of taxes and social security contributions cannot be too high. What "too high" means will vary from time to time and culture to culture, but there is definitely a limit on the total of taxes and contributions beyond which a country will reap fewer dollars of income.

Similarly, one does not wish to have the total of taxes and contributions be so high that employers do not want to hire new labour. Employers have a choice. If taxes and contributions get too high, they can move

work offshore by outsourcing. Even before acting to that extent, employers have the choice of offering overtime to existing workers rather than hiring new workers. Depending on the design of the social security system, offering overtime to existing workers may not add any extra social security contributions, as most systems have a maximum salary to which contributions attach.

The system should not have a benefit structure that creates any disincentives for individual workers to also save for their own retirement. This could be the result if the combined Pillar 0, Pillar 1 and Pillar 2 benefits are too large. But for marginal workers, this could also result if there exists a “clawback” of early public benefits that is so rapid (steep) that it creates the equivalent of very high marginal tax rates on personal savings.

In general, it is becoming increasingly difficult for workers to achieve financial security in retirement. There are several reasons for this.

Pressure has been placed on DB social security schemes around the world. For those that have no assets and pay benefits on a PAYG basis, this is primarily due to increased longevity, which increases expenditures and must then feed back into increased contributions (without other amendments). Also, most developed countries are facing rapidly rising aged dependency ratios (the ratio of the elderly population – say 65 and up – to the population available for the labour force – say 18 to 64).

It does not really matter if the system is funded or PAYG. The real cost of supporting the aged is appropriately measured by the current period consumption possibilities that are transferred to them from the non-aged.

Earnings-related contributory schemes ensure that workers who might not save privately will have a pension upon retirement. But these retirement benefits also save the government significant costs in reducing the use of welfare benefits to alleviate poverty.



### Public policy implications

**This paper supports fairly long qualifying periods for full SSRS benefits. If ones want special provisions for military service or raising children (for example), one can handle each case by allowing the “drop out” of years that meet defined criteria. Thus, it may be possible for a person who raised children to get full benefits with less than the qualifying period for others. This is a far superior method than providing full benefits to everyone with a very short qualifying period because of the anti-selection the latter creates.**

## Political risk

One must include political risk in the discussion. In less-developed economies, this can be an extremely serious risk that cannot be hedged or even mitigated.

Both systems—PAYG or funded—can suffer from political risk.

One may have total faith in one’s government. However, as the share of GNP going to the SSRS rises disproportionately, politicians have the right to change the system in small to radical ways to cut these costs. If benefits are not indexed, the government can do this more surreptitiously by allowing inflation to rise, thus cutting benefits in a somewhat hidden manner. Even if benefits are indexed to inflation, workers will still realize a standard of living that falls with respect to workers if wages rise faster than inflation.

If the government controls the investment of the plan assets, this may result in funds being used for government priorities and not to maximize rates of return (with acceptable risk) (Sass, 2006).

If the assets are government bonds (as in the US OASDI SSRS) then the government may just spend the funds and then have to raise taxes when the bonds come due, effectively creating a PAYG system.

A publicly administered program may itself operate on a fully funded basis. This option is often disregarded as a valid option because of reports of governmental interference and abuse over the control of the huge funds involved, particularly in developing countries.

To go to the extreme, one advantage of PAYG financing is that the country's despot cannot abscond with the assets.

Beyond this point, the aspect of financing will not be of primary focus. The critical ultimate outcome in the affordability of any social security system is a healthy and growing economy. The method of social security financing may be of less importance in this regard.



### Public policy implications

**The critical ultimate outcome in the affordability of any social security system is a healthy and growing economy with honest government/administration.**

## Benefits

Another issue is the adjustment used if one retires early or late.

To start, are we better to have an “early retirement factor” equal to 0.5% a month (6% a year) that is easy to digest and remember, or are we better to have “correct,” constantly changing actuarial adjustments (perhaps to several decimal places) that no one can comprehend or remember? The old adage “Keep it simple, stupid” may apply to these public plans.

And that is generally true. To enhance transparency and comprehension, the overall benefit design of social security must be kept as simple as possible. If workers cannot comprehend the benefit structure, then attempts to affect changes in attitudes toward saving for retirement and age-at-retirement will inevitably fail.

These are all very important principles. They are also often in conflict among themselves. It will be extremely difficult to achieve all the goals outlined above (e.g., minimizing total costs while avoiding steep clawbacks).

One must also be cognizant and sensitive to the local culture and history in designing social security systems.

## Progressive versus regressive

Most SSRSs anticipate some redistribution of wealth from the rich to the poor.

However, if the particular SSRS is truly a pure DC system set up using individual accounts, then that system will be regressive. Why is this so? The reason is that wealthy people live longer than poor people (and this is not reflected fully in the private annuity markets). Evidence of this is overwhelming. (For a good summary of factors affecting retirement mortality, see Brown & McDaid, 2003).

SSRSs that have minimum guaranteed benefits, as Pillar 0, may not need any explicit progressivity in Pillar 1 benefits. This would describe the Swedish NDC system, which has such minimum Pillar 0 benefits and a pure DC Pillar 1. In Canada, the Canada/Quebec pension plans (C/QPP) do not have to be progressive in themselves since there are already Pillar 0 benefits (Old Age Security and Guaranteed Income Supplement) that are funded by general tax revenues and are highly progressive. Despite this, the C/QPP have an explicit feature in their contribution formulae that make them progressive regardless of Pillar 0 (i.e., the first \$3,500 of annual earnings do not attract contributions).

OASDI is clearly progressive (and its progressivity overcomes the longer life expectancy differential in favour of the wealthy) through its benefit formula with two bend points (i.e., lower wages achieve a higher benefit ratio than higher wages).

If an SSRS raises its normal retirement age (the earliest age at which full benefits are payable) then the probability that the system is regressive may rise.

This is because raising the normal retirement age represents a larger percentage cut in benefits for those with short life expectancies than for those with longer life expectancies.



The particular impact depends on the mortality patterns in the country by income level. For a full discussion, see Whitehouse and Zaidi (2008).

Finally, there is a limit to how progressive the SSRS can be. One important attribute of a well-designed SSRS is social solidarity. That is, all participants should want the system to continue in place. That means that even after accounting for progressiveness, the system must provide meaningful benefits to all participants, across the full earnings spectrum.

For a deeper discussion of progressiveness versus regressiveness in general, see Brown and Ip (2000).



### Public policy implications

**Most SSRSs anticipate some redistribution of wealth from the rich to the poor. However, if the particular SSRS is truly a pure DC system set up using individual accounts, then that system will be regressive because wealthy people live longer than poor people.**

## Voluntary versus mandatory

In a true voluntary SSRS, workers could choose to join, or not, on a completely voluntary basis. Few national SSRSs have gone this route. Most national social security systems appear, at least at first glance, to be mandatory. However, there can be a number of ways that this feature is depreciated.

For example, some systems do not require contributions from workers until their earnings achieve a defined level. This may encourage workers (and their employers) to shift into the cash economy. This will be reinforced if the system provides some guaranteed minimum benefit or provides significant benefits for very short periods of attachment or very small total contributions.

Other systems allow “drop-out” periods because of military service, disability, unemployment, child rearing and so on without any commensurate decrease in ultimate benefits. Again, such features create incentives for inappropriate action among workers (moral hazard). However, given the choice of some well-defined “drop-out” periods versus an SSRS that allows maximum benefits to be achieved with a very short participation history, one should prefer the “drop-out” option. In fact, the ability to achieve maximum benefits without at least 40 years or so of contributions seems ill advised.

In summary, a mandatory SSRS will mitigate anti-selection and moral hazard.

James et al. (2008) point out the advantages of not having to be concerned about anti-selection. According to their calculations, a mandatory, public SSRS offering the same benefits as the C/QPP (prior to the C/QPP benefit increases that began to be phased in in 2019) would cost between 8% and 9.5% of pensionable earnings. The variance between 8% and 9.5% is dependent on the asset-liability matching strategy. Similar benefits under a voluntary, private annuity system would require contributions of 11% to 12.5%. Private cost rates exceed the mandatory/public rate because of high private administrative costs and adverse selection costs (and these have about equal impact, i.e., 50/50). There also has to be a profit margin in a private system.

Adverse selection occurs because potential annuitants know more about their health than the insurance company. If the SSRS is voluntary, then more individuals with higher-than-average life expectancy will participate, biasing the average longevity upward, thus requiring higher contribution rates. Mitchell et al. (1999) show that the expected present value of annuity payouts per dollar of annuity premium averages between 80 cents and 85 cents for an individual chosen at random from the population, and between 90 cents and 94 cents for an individual chosen at random from the pool of individuals who purchase annuities. This could be alleviated if there were more risk classification within the annuity product.

Thus, a totally voluntary SSRS could result in a pricing spiral as those with lower life expectancy opt out. Ultimately, this pricing spiral means that SSRS contribution rates will only allow the most select lives to achieve a full market value through their participation.

At the other extreme, a mandatory, non-progressive SSRS may result in poorer workers subsidizing more wealthy workers since the latter live significantly longer on average. In this case, there should be other design features to counter this regressive redistribution (as previously discussed).

If one prefers a voluntary system but wants to maximize coverage, then an opt-out system is preferable to an opt-in system. Studies have consistently shown that automatic enrolment results in much higher participation rates than being forced to act to opt in. (This is indicated in Choi et al., 2001, and Schwartz, 2004).



### Public policy implications

**A mandatory SSRS will mitigate anti-selection and moral hazard.**

## Individual accounts versus commingling of risk

The primary purpose of an SSRS is to allocate rights to retirees to consume GNP in a manner that minimizes the probability of living in poverty. This is obviously true for an individual retiree, but it is also good for the national economy. Poor people do not buy goods and services and require Pillar 0 benefits to survive. Retirees with sufficient income contribute to the economy by buying goods and services and do not use welfare benefits.

It is also true that the design of the SSRS should be one that mitigates risk (variance) as much as possible in the goal of achieving income security.

For retirement income security, risks include investment and investment expense risk, interest rate risk, timing risk, inflation risk and longevity risk.

Investment risk is well illustrated in the work from Burtless, 2009.

Clearly, the worker can decrease the investment risk by choosing less volatile investments, such as government bonds. While it is true that the volatility decreases markedly, so too do the expected investment rates of return (Burtless, 2009).

Timing risk is the risk of being forced to annuitize when interest rates are low and annuity prices are, therefore, high (as was true for much of the prior decade).

For each of the five risks listed, large commingled systems achieve superior expected outcomes compared to individual accounts, some through the effective application of the law of large numbers, others through the efficiencies of scale.

A summary of the failure of individual account SSRSs in South and Latin America can be found in Arenas de Mesa and Lago (2006), Gill et al. (2004) or Sinha (2002).

In a commingled SSRS, all participants (and this may be the entire workforce) share these risks. In fact, some risks may be shared across generations of workers. In an individual account system, the individual worker carries all of these risks unilaterally. This is a responsibility for which the worker has little capacity. Most individual workers do not have investment expertise, and if they can find investment expertise it comes at a high cost.

On the other hand, large commingled funds can hire extremely good investment management at low per-unit cost. Such large funds can also participate in private placements not available to most investment funds. Further, they can achieve much lower per-unit administrative cost ratios. Good governance is essential.

Size matters. Ambachtsheer (2008) provides the following illustration. A person's salary moves from \$35,000 to \$65,000 over a 40-year career. They want to replace 60% of their final salary (= \$39,000) upon retirement. They will get \$25,000 from social security (comparable to Canada and the US), so they need \$14,000 per annum indexed.

Assuming they can earn a rate of investment return of  $i = 4\%$  real for 20 years and  $3\%$  real thereafter, they need to contribute  $6\%$  of salary over their lifetime to achieve this goal. If they have a well-managed plan (as can be expected on a net basis from a large commingled plan) that can earn an extra  $1\%$  per annum, then the  $6\%$  contribution rate falls to  $4.5\%$ .



On the other hand, if they face management expense fees equivalent to 2% (i.e., their rates of return are 2% and 1% real) then the contribution rate required rises to 10%. Further, if inflation is running at 2% per annum, they have made no net gain in purchasing power at all. They are merely standing still.

The literature indicates that if individuals are responsible for managing their own capital accumulation accounts, they do so conservatively and receive lower rates of return. They also face management expense ratios that could decrease their net rate of return by as much as 3% (300 basis points).

Ambachtsheer (2008) says that these commingled asset pools should be no smaller than \$10 billion. Such commingling would have to be facilitated by government regulation but could be done entirely by private sector managers so long as the total expenses were low (e.g., less than 50 basis points).

Finally, at retirement, the individual worker must either manage their own retirement savings or buy an individual annuity. Brown (2000) states that the opportunity to participate in an actuarially fair annuity market is equivalent to a 50% increase in non-annuitized wealth. However, the higher cost involved in having to purchase a retirement annuity from the private sector because of higher administrative costs and the anti-selection factor faced by the private insurer has already been noted. That is, the insurer will price all annuities on the assumption that a voluntary purchaser has five-star life expectancy. Clearly this results in the poor subsidizing the rich (Brown, 2000). Thus, unless the retiree has five-star life expectancy, it is not clear which is better: buying an annuity from the private sector or managing one's own assets and one's own longevity risk. (Brown, 2000, states that the vast majority are still better off to annuitize.)

For the reasons just outlined, an optimal SSRS will provide income for life rather than a lump sum at the defined point of retirement. Most individuals cannot manage these lump sums, and fair-value annuities are only equitable to those in five-star health (see Diamond, 2004). In conclusion, a lump-sum SSRS should not be adopted.

It is the position of this paper that benefits should retain their purchasing power. Thus, benefits should be indexed to at least the cost of living. Whether post-retirement benefits should be indexed to wages (thus guaranteeing a consistent standard of living for retirees) will not be discussed in this paper. However, most individual account proposals for social security reform do not include indexation of benefits.

Many portray individual account SSRSs as being advantageous because such systems do not provide incentives for early retirement, thus guaranteeing a robust workforce. Countering that, however, is the indication that DC SSRSs can cause significant variation in the aged dependency ratio over time. That is, a country dominated by DC schemes may, over time, be exposed to significant risk in the size of its labour force (MacDonald & Cairns, 2007). This is true because the financial markets' conditions strongly affect the retirement pattern of the country's citizens, making the aged dependency ratio unpredictable, which may be contrary to the interests of society at large.

To illustrate, the economic meltdown of 2008 would decrease DC account balances, causing those wishing to retire to stay in the labour force at a time of high unemployment. Rapid economic expansion and healthy asset returns would have the opposite, but still perverse, impact (i.e., workers would retire at a time of labour shortages.)

Finally, while this paper discusses only the retirement income portion of social security, most social security systems also have benefits for disability and death that are somewhat difficult to replicate under the individual account design.

In short, there seems to be nothing to recommend individual accounts as the plan design preference for a national SSRS (see also Diamond & Orszag, 2004, and Burtless, 2009).



### Public policy implications

**For each of the five risks listed, large commingled systems achieve superior expected outcomes compared to individual accounts, some through the effective application of the law of large numbers, others through the efficiencies of scale.**

**An optimal SSRS will provide income for life rather than a lump sum at the defined point of retirement.**

## Public versus private

How much of the provision of retirement income security should be the responsibility of society through the government and how much should be left to private/individual initiative?

The answer to this question will certainly vary based on local culture. It is doubtful that the Scandinavian countries would ever have the relatively low SSRS replacement ratios common in the United States, for example (or vice versa).

Further, the discussion of what is public and what is private is often murky. If private retirement savings have measurable tax incentives (as in most countries) then is this not the same as public participation? And many of these tax incentives have a regressive impact since they benefit those in higher tax brackets more. This aspect is often missing in the normal debate on these matters.

Clearly, there is no magically “correct” answer.

## Resetting the age of eligibility for social security

Increasing life expectancy is leading to higher old-age dependency ratios: those retired versus the working-age population. Pensioners are living longer; therefore, the working-age population has to sustain retirement financing for an increasing number of retirement years, while the number of working years has remained relatively constant. If we retain a constant retirement age, old-age dependency ratios will continue to rise (see Table 1 below). The decline in fertility rates also plays a role in higher old-age dependency ratios because they lead to a decline in the working-age population (without huge levels of immigration) and ultimately to a softening of growth in the GNP and tax revenues. Without proper reform strategies, the growing demand for financial support in retirement will potentially strain social security programs. Thus, we need to continue to study potential reforms.

**Table 1**  
**Aged dependency ratios (Age 65+/Ages 20-64) %**

Country	1952	1962	1992	2022	2052	2082
Italy	14.6	16.9	25.4	41.0	78.1	83.4
France	19.7	21.5	24.9	39.3	57.1	68.4
Japan	9.9	10.8	21.6	55.4	80.0	85.7
UK	18.3	20.7	26.9	33.2	49.1	63.8
Germany	16.9	19.8	23.7	38.0	59.1	64.8
US	14.9	18.1	21.0	29.4	43.4	57.7
Canada	14.5	15.3	18.9	31.7	46.3	59.5
China	9.6	8.0	9.7	21.6	58.8	92.9
India	6.5	7.3	8.6	11.7	26.2	50.4

Source: Organisation for Economic Cooperation and Development, Pensions at a Glance, 2023, Table 6.2 Demographic old-age to working-age ratio: Historical and projected values, 1952-2082

Governments across the globe have been implementing various strategies to protect their social security programs. A common but highly debated strategy in pension reform has been raising the retirement age (the age of eligibility for full benefits).

The American Academy of Actuaries (2010) has advocated raising the retirement age for social security programs based on actuarial logic, noting that accounting for future increases in life expectancy is necessary in ensuring financial soundness of these systems. The fact is that SSRs put themselves at risk if they keep a constant retirement age for years to come. As the American Academy of Actuaries (2008) states, “This is primarily a demographic problem that demands a demographic solution.”

Herein, we refer to the retirement age for social security programs as the age of eligibility (AOE). This may be defined as the earliest age at which an individual is permitted to receive a full (unreduced) pension from the government. Generally speaking, the AOE is effectively the age that separates the working-age population from the retired population. The AOE directly impacts both the amount of retirement benefit financing needed and number of working years upon which contributions will be derived, and, thus, should be a primary consideration in the reform of any social security program. Evidently, lowering pension benefits but, in particular, raising the AOE have been popular political reforms in many countries. Some other countries have integrated automatic adjustment mechanisms. These aim to rebalance pension systems in line with the evolution of demographic, economic and financial parameters. The United Kingdom, Finland, Sweden and Norway have legislated changes to their pension AOE, which aids our subsequent discussion (Eisen et al., 2022).

Supplying adequate retirement income while remaining financially sustainable is an important mandate for the government (Organisation for Economic Co-operation and Development, 2015). Balancing sustainability and adequacy is critical, as reform initiatives must be as equitable as possible for the entire population. Governments will confront several issues in legislating reforms, such as fairness to different income classes and intergenerational equity considerations.

Social security reforms are inherently political and, in the end, inevitably represent compromises among various interests (Organisation for Economic Co-operation and Development, 2015). The AOE is an important component of this issue and should not be determined solely based on political rationale. We highlight the importance of actuarial reasoning in the decision-making process. Actuaries are equipped with the expertise to assist policymakers with evaluating the impact of demographic factors and assessing sensitivities in modifying the AOE.

These comments are motivated by a study done by a working party of the Institute and Faculty of Actuaries in the UK (Hammond et al., 2016) and the Department of Work and Pensions framework (Department of Work and Pensions, 2013). The reader is strongly encouraged to read this study.

The process suggested in the UK does not address the treatment of a fall in life expectancy, since it is built on the assumption that life expectancy will continue to rise. Given the unpredictability of future longevity, this limitation may create problems for the future. That is, what happens if life expectancy falls? Will the AOE fall as well?

The Department of Work and Pensions study process has been applied to Canadian population statistics by Brown and Aris (2017).

Note that the rise in the AOE is not equivalent to the rise in life expectancy of the retired population, nor should it be.



### Public policy implications

**The AOE directly impacts both the amount of retirement benefit financing needed and number of working years upon which contributions will be derived, and, thus, should be a primary consideration in the reform of any social security program.**

## Pillar 2

The paper has focused mostly on SSRs to this point. We now turn our attention to an optimal design for private pension plans. We deviate slightly from the World Bank definition of Pillar 2. We will define Pillar 2 as workplace pension plans, mandatory or voluntary and traditional DB or DC (we will discuss target benefit plans a little later).

## Defined benefit versus defined contribution

### i. Defined benefit

In a traditional DB plan, almost all of the pension risks are carried by the plan sponsor. These risks include:

1. investment risk
2. expense risk
3. inflation risk (if the benefit is indexed)
4. interest rate risk
5. longevity risk (if the payout is not annuitized)

During the 1990s, sponsors were able to pay large retirement benefits through very high investment returns. But since 1999, we have experienced three market meltdowns, lower investment returns and lower long-term interest rates leading to higher actual pension contributions and higher volatility. This has been exacerbated by ever-increasing life expectancy and the continuing maturity of pension systems (a rising ratio of retirees to contributors).

### ii. Defined contribution

This section includes both employer-sponsored DC pension plans and individual account systems.

Under a traditional DC plan, the worker carries all of the pension risks listed. If experience is bad, the member must accept a lower retirement benefit. The employer is not required to fill the gap. Clearly, an individual worker is not capable of managing these risks. While many of these risks can be mitigated to some extent, most cannot be totally avoided or can only be avoided at an unreasonable cost.

Workers can decrease portfolio risk by gradually choosing less volatile investments, such as government bonds, as they approach retirement. While volatility decreases markedly, so too do the expected rates of return.

Investment risk can be mitigated. The sponsor may suggest a number of investment options. Or the worker can hire an investment adviser. However, this only shifts the investment risk to an expense risk. Advice can cost 3% of the gross rate of return (the management expense ratio). If funds earn 5% and inflation runs close to 2%, then that worker is actually receiving no real return at all.

Workers also tend not to shift their investments as they approach retirement – out of equities into fixed-income securities, which is called life-cycle investing (Munnell et al., 2013). Thus, many (most) individual account holders lost 20% to 30% of their equity values in the 2008-09 financial crisis. Work by the Organisation for Economic Co-operation and Development (OECD) (Antolin, 2009) indicates that the market crash of 2008-09 could have led to a drop in replacement ratios of almost 10 percentage points.

On a macroeconomic basis, another result of the investment risk inherent in DC plans is that these plans produce counter-cyclical retirement patterns. When the economy is soft and we want workers to retire (to ease unemployment) workers will have deflated DC asset values, forcing them to work longer. Similarly, when times are good and DC balances are high, workers will choose to retire just when needed for an expanding economy.

A second major risk for a DC participant is longevity. Workers who do not buy an annuity or do not have a pooled decumulation option available to them must determine an optimal program of income withdrawal. Depending on their desire to leave a bequest, they will want to take out the maximum income possible without outliving their assets – a lot to ask. Who knows one's life expectancy? So, to be sure they will not outlive their assets, they make conservative withdrawals and live at a lower standard of living than necessary. Taking more aggressive withdrawals increases the probability of outliving their assets and thus becoming dependent on friends and family, or on government programs. This should also be a concern to taxpayers who pay for such welfare benefits.

Large DB plans are more effective and efficient since they need only accumulate enough funds to cover the average life expectancy of all plan participants. These funds can also invest in less liquid (and higher yielding) assets since the idiosyncratic risk in life expectancy is small.

Further, there should be no sudden forced asset sales. (Aside: we will discuss how DC plans can do some of the same using variable payout life annuities in our discussion of target benefit plans.)

The DC worker can mitigate the longevity risk by buying a life annuity. This again raises the expense risk, as insurers must operate at a profit. Further, many workers cannot get a true market-value annuity. That is because most insurers price annuities by assuming that a voluntary applicant for an annuity has five-star health. Few workers actually do, but they get painted with the “one-size-fits-all” brush. Annuities can be cost-effective for mitigating longevity risk, but not for everyone. Purchasing an annuity also creates interest-rate risk on the day of purchase.

Solutions to the longevity risk may be regressive. There are clear data (Brown & Prus, 2004; Whitehouse & Zaidi, 2008) that wealthier people live longer. And this is not only because healthier people make more money. It is because of the stability, socialization, and access to care that result from wealth and education (Brown & McDaid, 2003). Thus, if one charges the same rate for all life annuities, one is penalizing the poor who, it might be argued, are those in most need of being able to transfer the longevity risk. It is thus debatable as to whether a poorer worker should annuitize at retirement.

The more choice one gives as to investment funds for individual accounts, the more likely it is that savings end up in the default option. In Australia, 80% of participants in super funds went to the default investment option (Australian Government, 2010). This does not have to be totally negative.

For example, in the Swedish NDC system, which offered 456 investment options, the majority of participants ended up in the default fund, but the default fund outperformed nearly all of the other funds, so the story ended well (Australian Journal of Actuarial Practice, 2014).

In short, in the case of a social security system based on individual accounts where the workers invest their funds, inadequate education of the public, lack of any smart default option, and inadequate regulation and supervision of the investment managers may result in poor investment choices, high transaction costs and thus lower than expected net returns. To conclude, there appears to be little economic support for individual account SSRs (see Arenas de Mesa, 1997; Gill et al., 2004; Sinha & de los Angeles Yañez Acosta, 2008; Diamond, 2004; and Diamond & Orszag, 2004).

This also applies to private pension plans. Individual accounts should be avoided. If one is going to use a DC approach for the design and funding of private pension schemes, then this should be accompanied by large commingled asset pools. This will allow spreading and sharing of the risk. Further, these commingled asset pools can be used to pay out retirement benefits, once again sharing the risks widely. More on this later.

Finally, it is very difficult for an annuity to provide inflation protection, a worthy social goal that DC plans cannot cost-effectively achieve. Large DB plans can provide some inflation protection even if such protection is contingent on healthy plan funding

In total, the individual-account DC option creates more problems than solutions. One cannot guarantee retirement income security just by saving for retirement.



### **Public policy implications**

**Clearly, an individual worker is not capable of managing the previously mentioned five pension risks in a DC world.**

**Workers in a DC world may make conservative withdrawals and live at a lower standard of living than necessary.**

**Large DB plans are more effective and efficient since they need only accumulate enough funds to cover the average life expectancy of all plan participants. The fund can also invest in less liquid (and higher yielding) assets since the idiosyncratic risk in life expectancy is small. Further, there should be no sudden forced asset sales.**

**If one is going to use a DC approach for the design and funding of private pension schemes, then this should be accompanied by large commingled asset pools.**



## Pooling of assets and longevity risk matters

One of the problems with individual accounts is mitigating risk as one individual. Many advantages come from having a larger asset and longevity pool, either by being part of a very large employment group or by allowing smaller pension funds (including individual accounts) to commingle their assets. Not only can one achieve savings in the expense of administration and management, but large funds also have investment opportunities that smaller funds do not (e.g., private placements). Further, if the commingled fund pays out the retirement income, then this large collective plan can gain from pooling the longevity risk.

Munnell et al. (2013) found that “fees have a significant effect on how much an individual will have at retirement. An additional 100 basis points over a 40-year period reduces final assets by about one fifth.”

DB plans, when professionally managed, are more efficient and effective than traditional small or individual DC plans and can deliver a given benefit at lower cost. For large DB plans, 75% of every benefit dollar comes from investment returns – a testament to the sound funding and best-in-class investing of these funds (i.e., only 25% of benefits come from contributions) (Brown & McInnes, 2014).

Robertson, Eadie & Associates conducted an independent study in Canada that compared investment returns obtained by individual investors in a DC plan that provided the members with investment choice against those obtained by a pension committee that collectively managed the investment process on behalf of all its DC plan members using the same investment techniques and mandate as were used for an existing DB plan. The collective plan obtained a 96th-percentile rating. That is, only 4% of the individual DC plan investors beat the collective result. Further, when investment expenses were deducted, the collective result was better than all individual results studied.

In a 2008 study comparing the cost of achieving equal benefits between DB and DC plans, Almeida and Forna (2008) found cost savings of 46% for DB plans composed of three parts:

- Longevity risk pooling (lower variation in the longevity risk) in a DB plan saves 15%.
- Maintenance of a balanced, highly diversified portfolio in a DB plan saves 5%.
- A DB plan’s superior investment returns, after expenses, save 26% as compared with a typical individual-account DC plan.

Brown and McInnes (2014) looked at the impact of these 46% savings on a model DB plan. Starting with an assumption that the plan earns 6.5% gross investment returns, they modelled a small plan earning 3.5% (46% less). The model DB plan was a fairly typical public sector plan with sponsor contributions of 12.5% matched by 12.5% participant contributions. If investment returns dropped from 6.5% to 3.5%, these matched contribution rates would rise to 22.5% (a 77% increase) to provide equal benefits. Instead of investment returns paying 75% of the benefits, they would only pay 55%. A large “best-practices” pooled DC plan (e.g., the US Thrift Savings Plan for federal civil servants and uniformed services) would lie somewhere in between.

Even if a DC plan could achieve sufficient size, there are still residual advantages to the DB model. DB plans provide a benefit that has true meaning and can be understood by plan participants. Benefits are a given percentage of salary or a defined number of dollars per year of service. Knowing this, workers can decide how much more they need to save to achieve retirement security.



### Public policy implications

**Many advantages come from having a larger asset and longevity pool, either by being part of a very large employment group or by allowing smaller pension funds (including individual accounts) to commingle their assets.**

## Searching for the pension holy grail

Our proposed pension paradigm will lower overall pension risks for both traditional DB and DC plans. Our pooled target benefit pension plans are meant to move beyond hope – but not as far as full guarantees – toward a high-probability benefit expectation.

In some jurisdictions these are called collective or commingled shared risk plans. MacDonald et al. (2021) refer to these as dynamic pension pools, and we will use this identifier from this point on. This model has been used in the UBC faculty pension plans since 1967. It has also been adopted by many of the Australian super funds. In many jurisdictions, such plans are not achievable because of pension regulations or tax laws.

The “pooled” characteristic means that plan assets for many plans are commingled to reap the benefits of “size.” The aim is a minimum asset portfolio of \$10 billion. It should be possible for individuals to commingle their pension assets (e.g., individual accounts) into these pools.

The plan would be governed and administered by an independent third party. The board for this third party would have appropriate representation from all stakeholders and, in particular, from sponsoring employers, covered employees and pensioners. The board would encourage all stakeholders to select individuals with pension expertise. As a result, most of the representatives would be experts in pension governance, administration or investments. This will ensure that the administration is streamlined and that both the member benefits and investments are coordinated well. The board will be the management board. It will make major decisions as to the governance of the fund and will liaise with the investment manager(s). It will also decide on any adjustment of benefits. The board must be independent of plan sponsors, employees, pensioners, internal and external service providers, government and investment managers.

For the plan sponsor, this new dynamic pension pool has fixed contributions and variable benefits, thus releasing sponsors from a huge amount of risk inherent in a traditional DB plan.

The initial target benefit could be based on some agreed-upon earnings-replacement objective. The required contribution rate would be set accordingly assuming, for example, 35 years of contributions but using slightly conservative actuarial assumptions, e.g., a lower recognition of the equity-risk premium.

Plan participants would receive regular updates on their expected retirement benefits. These updates will also remind participants that benefits are not guaranteed.

One key element here is that pension/tax laws must allow for benefit accruals to go both up and down. In many systems today, benefit accruals can never go down.

Given that the required contribution would be determined using slightly conservative assumptions, these plans could mitigate the inflation risk. Pre-retirement, one could upgrade the participant’s earnings profile and move from a career-average plan closer to a final-average plan. Post-retirement, any gains would be used for cost-of-living adjustments. While there is no guarantee that true consumer price indexation will result, this would move indexation from a hope to an expectation.

None of these plans will have low employer/employee contributions (i.e., < 5% of pay). Antolin (2009) indicates that a contribution rate of 5% would provide a replacement ratio of 25.3%, while a contribution rate of 10% would double that to 50.7%.

This new plan will result in huge improvements for traditional DC plan participants. No longer will they have the responsibility for investing their funds. This will be done by the arms-length independent investment manager(s) operating at very low expenses.

Asset values will go up and down but should not have a full or immediate impact on the benefit schedule. (This is now true for Canadian multi-employer pension plans.) However, benefit reductions are possible. If one provides retirement benefits through variable annuities, sound investment strategies are required to manage this process.

The plan can also manage the payout of benefits using a more collective (versus individual account) approach similar to the Teachers Insurance and Annuity Association of America and College Retirement Equities Fund (TIAA-CREF) plans in the US, which pay out variable life annuities. If independent insurance for a particular payout scheme is required, the plan will be able to obtain that insurance at better rates than those available to individuals.

As has been discussed, there are times when PAYG is favourable and times when fuller funding is to be preferred. Similarly, there are economic conditions that favour DB systems and other environments that favour DC.



However, overall, it is the position of this paper that the total national system should represent a diversified approach to providing retirement income security. Some parts of the system should be PAYG, some fully funded. Some benefits should be DB, some DC and some target benefit. But never should an entire national retirement income security system put all of its eggs in one basket.

Retirement income security requires a collective approach for the mitigation of risk.

Individual accounts, either for social security or for workplace pensions, place responsibilities on individual workers that are totally inappropriate. The result is suboptimal savings and consumption. Professional management is expensive and the agents may not act in the best interests of the workers.



### Public policy implications

**The paper proposes dynamic pension pools as the way forward for the private sector.**

**One key element here is that pension/tax laws must allow for benefit accruals to go both up and down. In many systems today, benefit accruals can never go down. A variable annuity approach for retirement benefits with sound investment strategies will help manage this process.**

**It is the position of this paper that the total national system should represent a diversified approach to providing retirement income security. Some parts of the system should be PAYG, some fully funded. Some benefits should be DB, some traditional DC and some target benefit.**

## Pillar 3

Remember that Pillar 3 (private savings) is voluntary. It is fully funded, regulated and privately managed. Government normally provides tax incentives to nudge workers to participate.

These tax incentives can be “taxed, exempt, exempt” (TEE) or “exempt, exempt, taxed” (EET). In a TEE system, contributions are made out of after-tax dollars. Investment income accrues tax free. And withdrawals are neither taxable nor do they negatively impact any clawbacks in Pillar 0 benefits. This describes tax-free savings accounts in Canada.

In an EET system, contributions are tax deductible. Investment income accrues tax free. But withdrawals are taxable income and can have a negative effect on any clawbacks in Pillar 0. This describes registered retirement savings plans in Canada.

But we need to do more than accumulate assets. We must provide secure retirement income for life.

For either system, participants should be allowed to pool their assets in large dynamic pension pools. This raises the investment return by allowing for a wider range of investments (e.g., pursue a “risk” premium) and should also result in much lower expense ratios. More importantly, upon retirement, the participant is now a part of a large group so that the longevity risk becomes totally manageable. The retirement income would be in the form of a variable payout life annuity. The “variable” would include variation both for realized versus assumed investment income and also for realized versus assumed life expectancy. This model has been used in the UBC Faculty Pension Plan since 1967 and is the model used by TIAA-CREF.



### Public policy implications

**Participants should be allowed to pool their assets in dynamic pension pools. This raises the expected rate of return, and in retirement the longevity risk becomes totally manageable.**

## Pillar 4

Pillar 4 is an informal intra-family or intergenerational pillar that includes financial and non-financial support to the elderly, including access to health care and housing. The government is not directly involved, although it may create some tax incentives. An example is the cohabitation of differing generations in one home.

We have no specific guidelines for Pillar 4.

## Conclusion

Overall, it is the position of this paper that the total national system should represent a diversified approach to providing retirement income security. Some parts of the system should be PAYG, some fully funded. Some benefits should be DB, some DC and some target benefit. Some administration should be private and some public. But never should an entire national retirement income security system put all of its eggs in one basket.

Diversity is strength.

In general, individual account systems should be avoided. Even DC pensions are acceptable only if accompanied by large commingled asset pools to which all contributors can participate.

SSRSs around the world seem to be in a continuous state of flux. Old designs are abandoned in favour of new science. In many developing countries, SSRSs are being implemented for the first time.

The purpose of this paper is to provide a schematic for public policymakers who promote certain SSRS design features. Should the plan be PAYG or fully funded? Should minimum benefits be in a separate Pillar 0 or be a part of government sponsored social security in a Pillar 1 plan? And so on.

This paper has presented a series of decision points in the design of an optimal SSRS. Through a background of a strong knowledge of the existing literature, the paper has attempted to steer public policy decisions in a direction that history has demonstrated is to be preferred.

It is the author's sincere hope that the discussion above will be used to improve the design features of future SSRSs around the world.

An optimal design for private pension plans is a "dynamic pension pool." In total, this creates the most appropriate risk bearing and risk sharing.

**In short: there are five ingredients that will provide security for any retirement income security system:**

- 1. A healthy and growing national economy with rapidly expanding earnings.**
- 2. An efficient and accurate records administration system.**
- 3. Sustainable contributions/benefits.**
- 4. A financially literate population.**
- 5. An honest government.**

At the end of the day, it is worth reminding ourselves that retirement income security systems are a means of determining how much of a country's GNP can be consumed by the elderly.

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