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Criteria for the Optimal Design of a Social Security Retirement System

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SEDAP Research Paper No. 266

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May 2010

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Abstract

This paper discusses a series of selection points in the design and financing of social security retirement systems. For each criterion, the paper lists and discusses advantages and disadvantages of the options available.

The selection points include:
--Funded versus PAYGO
--Minimum benefits: Demogrant or Welfare
--Progressive versus Regressive
--Voluntary versus Mandatory
--Individual Accounts versus Commingling of Risk
--Public versus Private sourcing
--Automatic Balancing Mechanisms
--System Risk Diversification

It is the sincere hope of the author that this discussion will create even more debate of the issues surrounding these important selection criteria which, in turn, will result in better social security retirement systems for all.

Résumé

Cet article examine un certain nombre de points pertinents à la mise en place et au financement des retraites publiques. Pour chaque critère, ce papier fait l'inventaire et discute des avantages et inconvénients de chaque option disponible.

Les critères de sélection sont les suivants:
- Un système à capitalisation entière contre un programme par répartition
- Prestations minimales: subventions démographiques ou prestations d'aide sociale
- Progressif ou régressif
- Contribution volontaire ou obligatoire
- Comptes individuels ou mise en commun des risques
- Source de financement publique ou privée
- Des mécanismes d'équilibrage automatiques
- Diversification des risques du système

C'est l'espoir sincère de l'auteur que cet article engendre une discussion encore plus approfondie autour de ces critères de sélection importants qui, à son tour, se traduirait par la mise en place d'un meilleur système de retraite public pour tous.

JEL Classification: H55
Key words: Social Security design and financing, Funded pay-as-you-go, Individual Accounts, Automatic Balancing Mechanisms

Introduction

This paper reviews a series of criteria that are decision points in the design of social security retirement systems (SSRS). For each criterion, the advantages and disadvantages of the options available are outlined and discussed briefly. In this manner, the paper attempts to lead public policymakers to a set of design criteria that would result in optimal design for any SSRS. The author hopes to stimulate wide discussion of these important debating points.

It can be shown that the Notional DC systems in Sweden, Italy and Poland are equivalent to Career Average DB plans with annual adjustments based on economic growth. Thus, any analysis about DC SSRS will reference Individual Account systems, not Nominal DC systems.

The paper is targeted to SSRS public policymakers. Thus, some very traditional points of debate, while referred to, are not discussed in great detail.

Financing: Funded versus PAYGO

First, one should differentiate between funding and financing. SSRS need not be funded; certainly not fully-funded. They only need to be financed in a sustainable manner, which is quite a different matter. Having said that, it is very difficult to achieve continuous sustainability in a pure pay-as-you-go system without unacceptable contribution volatility. Thus, it is the position of this paper that an optimal SSRS design would include enough (partial) funding to overcome the peaks and valleys caused by the volatility in demographic and economic variables.

More heavily funded SSRS are preferable when rates of return on investments exceed the rate of growth of the contributions base of the SSRS (which is the reality in many advanced economies with aging populations today). Less funding (and hence more PAYGO financing) would be preferred when the growth of the SSRS contributions base exceeds the rate of return on investments (see Aaron (1966) or Thompson (1998)).

The rate of growth of the contributions base of a SSRS is itself a function of several variables. A primary factor is the growth rate of the work force. This, in turn, is the result of a growing population (through rising fertility or higher immigration) or higher labor force participation rates. Also, the contributions base will normally rise when there is real wage growth, which usually relies on productivity gains.

It is worthy of note, however, that a funded SSRS is inherently no more secure and no more predictable (i.e., less volatile) than a PAYGO scheme. It is no easier to predict future investment rates than future fertility rates. Thus, using a ‘stability’ argument in favor of fuller funding may find merit in some advanced economies with aging populations today, but may not be advisable in many other economies or other times. One need only review the history of many European (fully-funded) SSRS in the period 1930 to 1950 to understand the validity of this observation (when these fully-funded

SSRS were wiped out by hyper inflation). Further, Thompson (1998) states 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.

SSRS are effectively means to allocate goods and services between workers and retirees. That is, 'they' decide how much of the Gross National Product SSRS beneficiaries can consume. The absolute dollar value of the promised benefit has little meaning in and of itself.

If a PAYGO social security system has a 10% contribution rate, then workers have effectively agreed to pass all of their production on Monday morning over to the country's retirees for consumption.

If the plan is fully funded, then the transfer is more complex, but equivalent. The worker takes 10% of pay (reflecting the value of 10% of product) and seeks to buy assets. Such assets will be available from retirees (who amassed them during their working lifetime). Upon sale, the retiree gets money for his/her assets and then uses this money to buy goods and services. The end result is equivalent to a PAYGO scheme. In particular, both PAYGO SSRS and fully-funded SSRS are absolutely dependent on a next generation of workers to produce goods and services. Neither is demographically immune. If there is no production, there is no consumption.

Both systems suffer from political risk. In a PAYGO SSRS, the government can change the benefit or contribution formula and deny workers their assumed promise. In a fully-funded SSRS, the government can allow inflation to deplete the value of the individual accounts, once again nullifying the implied contract with workers.

These axioms bear further reflection. Many important re-designs of SSRS around the world were based on criteria other then "who gets to share in total Gross National Product"? Other less important (side-bar) issues became the focus of the reforms. Does fuller funding increase national savings? Does the financing method create a more rapid rate of economic growth? Does the level of funding assist in creating a good banking system or a good stock market infrastructure? What impact does the design of the SSRS have on labor force participation rates or on the age of retirement? Does the design of the SSRS incent a cash economy? A careful reading of the literature says that there are no clear answers to most of these questions (see, for example, Brown, 1997). While these may be very important questions, they should not be the driving focus for a well-designed SSRS. The number one criterion should be the ability of the elderly to share in total Gross National Product at least to the extent that poverty is alleviated.

On another point, one must ask if there is any economic difference between a PAYGO SSRS and one that is funded but where the assets are all government bonds (especially if the positive or negative cash flow of the SSRS is 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. Does it make any difference (except in the

name) which happens: SSRS contributions are paid or bonds are redeemed? They are surely the same in both size and timing.

Funded SSRS also introduce political risk. As Sass (2006, p8) states:

> *These risks are that a trust fund would:*
>
> • *become a captive source of credit that would fund the government at below-market rates;*
> •*invest in "socially desirable" projects and/or avoid "socially undesirable" projects;*
> • *use its power as a major shareholder to promote "socially desirable" and/or avoid "socially undesirable" corporate decisions, such as those regarding plant closing or mergers and acquisitions; and*
> • *prop up financial markets in a "crisis".*

At the very least, an independent, 'at-arm's-length' investment agency should be mandated. One such workable model would be the Canada Pension Plan Investment Board created in 1996.

Finally, a dishonest leader of a country with a funded SSRS, can abscond with the plan assets in the middle of the night. If the plan is PAYGO, then the leader can only abscond with its liabilities!

Minimum Benefits: Demogrant or Welfare

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 poverty. That is, an acceptable SSRS will create at least subsistence level benefits.

It is the position of this paper that this first pillar of benefits (sometimes called Pillar 0) should be financed out of general tax revenues and not from earmarked contributions. This will make the Pillar 1 SSRS much easier to design since it does not have to include in its formulation the provision of a minimum benefit. As one example, the design of the U.S. OASDI system is unnecessarily complex because it is expected both to provide a minimum benefit but also have a strong sense of individual equity (whereby benefits are a function of contributions). OASDI could be designed more easily and more logically if there existed a separate Pillar 0 benefit. While the U.S. does have a Supplementary Security Income (SSI) program, it is too small to satisfy the full needs of poverty alleviation (See Brown and Prus (2004) and Wiseman and Ycas (2008)).

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.

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 workers may cash out their SSRS benefits at retirement (i.e., take a lump sum where possible), spend this cash quickly, so as to qualify for the Pillar 0 benefit. Clearly, this is not desirable.

This is a very difficult problem. One must balance the rate of the clawback very carefully. If the clawback is low, then Pillar 0 will be very costly and benefits may go to recipients who are not in need. The extreme of this is a demogrant benefit with no clawbacks (although benefits might be taxable). If the clawback is high, then the perverse incentives outlined above will be the result.

Regardless of whether the Pillar 0 benefits are demogrant or welfare, there should be a lengthy period of qualification (e.g., residency) for the minimum benefit. Short qualifying periods will lead to other perverse results such as early retirement or low labour-force participation. A 40-year qualifying period is not unreasonable.

Progressive versus Regressive

Most SSRS 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 and McDaid, 2003).

SSRS 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 that 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.

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 a 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).

Voluntary versus Mandatory

In a true voluntary SSRS, workers could choose to join, or not, on a completely voluntary basis. Few national SSRS 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 amongst the workers (moral hazard). However, given the choice of some well-defined 'drop-out' periods versus a 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 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 would cost between 8 and 9.5 per cent of pensionable earnings (as defined by the C/QPP). The variance between 8 and 9.5 per cent is dependent on the asset-liability matching strategy. Similar benefits under a voluntary, private annuity system would require contributions of 11 to 12.5 percent. 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 and 85 cents for an individual chosen at random from the population, and between 90 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 SSRS, based on the principles of individual equity (i.e., non-progressive) will result in poorer workers subsidizing more wealthy workers since the latter live significantly longer on average. This is the likely result in Defined Contribution SSRS, including Individual Accounts SSRS. 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 enrollment results in much higher participation rates than being forced to act to opt in. This is indicated in Table 1 (Choi et al, 2001). (See also Schwartz, 2004.)

TABLE 1. 401(k) Participation by Tenure Before and After Automatic Enrollment

	Company B			Company C			Company D		
	Hire Date			Hire Date			Hire Date		
	Before AE	After AE	After - Before	Before AE	After AE	After - Before	Before AE	After AE	After - Before
Tenure									
6 months	26.4%	93.4%	67.0%	35.7%	85.9%	50.2%	42.5%	96.0%	53.5%
12 months	37.8	95.7	57.9	40.2	85.3	45.1	49.6	96.6	47.0
18 months	47.7	97.0	49.3	44.3	86.0	41.7	56.6	97.2	40.6
24 months	54.1	97.6	43.5	49.8	85.7	35.9	61.7	99.1	37.4
30 months	60.0	97.7	37.7	--	--	--	65.6	98.8	33.3
36 months	64.7	98.8	34.1	--	--	--	69.0	100.0	31.0

The sample for Companies C and D is all 401(k)-eligible employees. For Companies B and D, the first two columns of numbers give the fraction of employees who have ever participated in the 401(k) plan. For Company C, the first two columns give the fraction of employees contemporaneously participating in the 401(k) plan.

Source: Choi et. al. (2001)

Individual Accounts versus Commingling of Risk

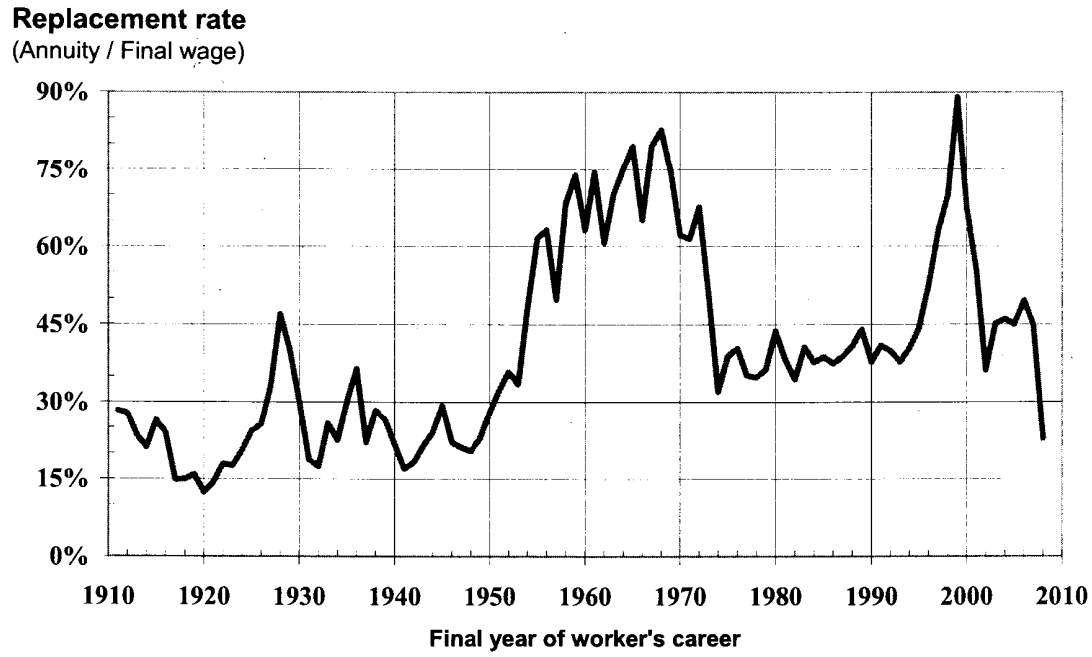
The primary purpose of a SSRS is to allocate rights to retirees to consume Gross National Product in a manner that minimizes the probability of living in poverty. In that regard, the design of the SSRS should also be one that mitigates risk (variance) as much as possible in the goal of achieving income security.

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

The investment risk is well illustrated in the following graph from Burtless, 2009.

Figure 1

Replacement rate obtained from personal account savings of workers who invest solely in stocks and contribute 4% of annual salary over a 40-year career

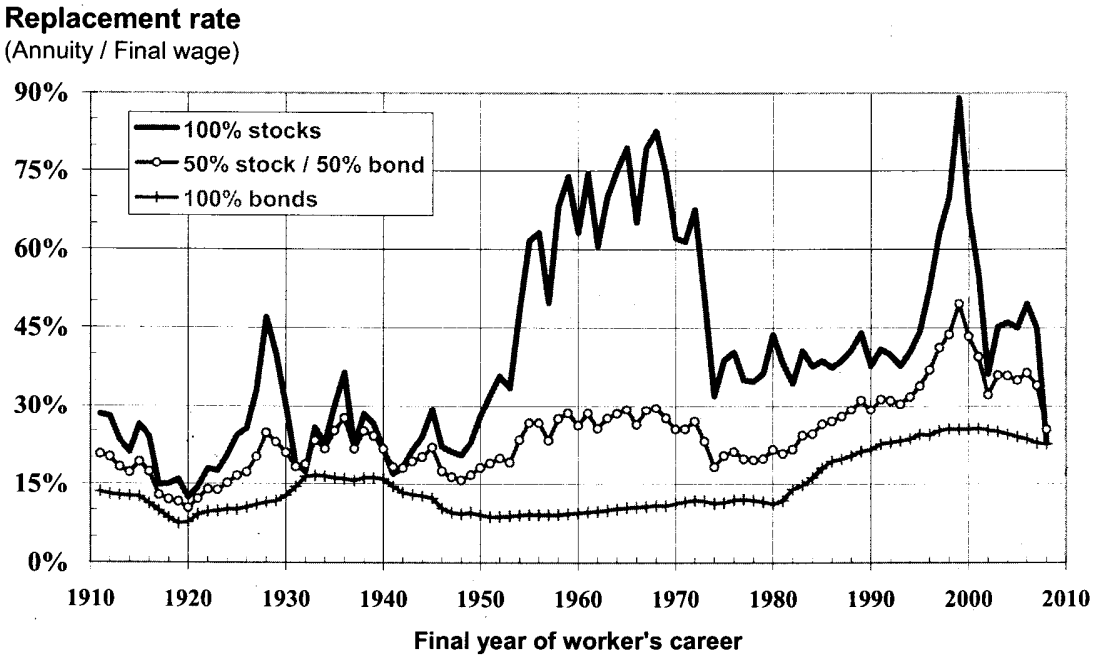


Source: Burtless, 2009 p 12

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 Replacement Rates as seen in Figure 2.

Figure 2

Replacement rate obtained from personal account savings of workers who invest in alternative portfolios and contribute 4% of annual salary over a 40-year career



Source: Burtless, 2009, p 16

The replacement ratios in the above graphs also display the impact of the timing risk. This is the risk of being forced to annuitize when interest rates are low and annuity prices are, therefore, high. This is true in 2010.

For each of the five risks listed, large commingled systems achieve superior expected outcomes than 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 SSRS 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 work force) share these risks. In fact, some risks may be shared across generations of workers. In an Individual Accounts 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.

Size matters. Ambachtsheer (2008) provides the following illustration. Your salary moves from $35,000 to $65,000 over a 40-year career. You want to replace 60 per cent of your final salary (= $39,000) upon retirement. You will get $25,000 from social security (comparable to Canada and the U.S.), so you need $14,000 per annum indexed.

Assuming you can earn i = 4 per cent real for 20 years and 3 per cent real thereafter, you need to contribute 6 per cent of salary over your lifetime to achieve this goal. If you 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 cent per annum, then the 6 per cent contribution rate falls to 4.5 per cent. On the other hand, if you face management expense fees equivalent to 2 per cent (i.e., your rates of return are 2 per cent and 1 per cent real) then the contribution rate required rises to 10 per cent. Further, if inflation is running at 2 per cent per annum, you have made no net gain in purchasing power at all. You 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 per cent (300 bps).

Ambachtsheer (*ibid)* says that these commingled asset pools should be no smaller than $10B. 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 40 basis points).

Finally, at retirement, the individual worker must either manage his or her own retirement or buy an individual annuity. Brown, 2000, p19, 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 (*ibid*). 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).

Without having a separate discussion, it is for the reasons just outlined that an optimal SSRS will provide income for life rather than a lump sum at the defined point of retirement. Individuals cannot manage these lump sums and fair-value annuities are only available to those in five-star health (see Diamond, 2004). In conclusion, a lump-sum SSRS should not be adopted.

Again, without a separate discussion, 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 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 Accounts SSRS as being advantageous because such systems do not provide incentives for early retirement. Countering that, however, is the indication that DC SSRS can cause significant variation in the dependency ratio over time. That is, countries dominated by DC schemes may, over time, be exposed to significant risk in the size of its labor force (MacDonald and Cairns, 2007). This is true because the financial market's condition strongly affects the retirement pattern of its citizens, making the 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 labor force at a time of high unemployment; rapid economic expansion and healthy asset returns would have the opposite, but still perverse, impact.)

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 and Orszag, 2004, 35-48 and Burtless, 2009).

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 will certainly vary based on local culture. It is doubtful that the Scandinavian countries would ever have the 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.

Automatic Balancing Mechanisms

SSRS that are based on Individual Accounts do not need Automatic Balancing Mechanisms (ABM) since the retirement benefit available to the worker is only what his or her account balance can purchase. Thus, by definition, the system is always in 'balance'.

Many DB SSRS around the world (e.g., Canada, Brazil, Sweden, Germany, and Japan) have introduced ABM into their systems. These are meant to return a plan to sustainable financing when external forces (e.g., economic or demographic) create a non-sustainable balance of contributions and benefits.

It seems advisable that such ABM should react towards these imbalances by sharing the pain as equitably as possible between workers and retirees. If the system is based on defined contributions the only variable in the system on which the ABM can work must be the benefits. In this case, the Automatic Balancing Mechanism will be one-sided in that all of the impact will be on retiree benefits (as is the case in Sweden today).

Only one of the above SSRS shares the 'pain' between workers and retirees at this time (Canada) and it can be shown that under 'normal' circumstances even the Canadian ABM hits retiree benefits harder than worker contributions.

This does not seem appropriate as retirees normally have no way to respond to reduced benefits and reduced standards of living.

System Risk Diversification

A basic economic/actuarial tenet is that one way to mitigate risk (variance) is through diversification. That is, don't put all of your eggs in one basket.

This tenet should extend into the design of the total retirement income security system of any country (see Diamond, 2004).

Most countries will have a variety of sources for retirement income for their citizens that, in terms of system diversification, is advantageous. These will normally include:

--a basic welfare-based income financed by tax revenues;
--a government-sponsored universal SSRS with contributions/benefits that reflect both individual equity and social adequacy;
--employer-sponsored workplace pensions (DB or DC);
--individual savings.

The first layer will normally provide Defined Benefits and be financed on a PAYGO basis. The second tier in most Western countries is still a Defined Benefit scheme although there has been a measurable shift to Defined Contribution SSRS over the past thirty years. If DB, these plans are normally only partially funded (but not pure

PAYGO). Similarly, employer-sponsored pension plans, thirty year ago, would have been primarily Defined Benefit plans but are now mostly Defined Contribution. In either case, they are meant to be fully funded at any time. Finally, individual savings are purely defined contribution schemes and are fully funded by definition.

It can be shown that there are times when PAYGO is favorable and times when full funding is to be preferred. Similarly there are economic conditions that favor DB systems and other environments that favor 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 PAYGO, some fully funded. Some benefits should be DB, and some DC. But never should an entire national retirement income security system put all of its eggs in one basket.

This is a very serious concern today as many nations are on the road to only one basket; namely, DC fully-funded systems. One can find nothing in basic actuarial science axioms to support this positioning.

Conclusion

SSRS 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, SSRS 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 PAYGO or Fully-funded? Should minimum benefits be in a separate Pillar (0) tier or be a part of government sponsored Social Security in a tier (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 SSRS around the world.

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