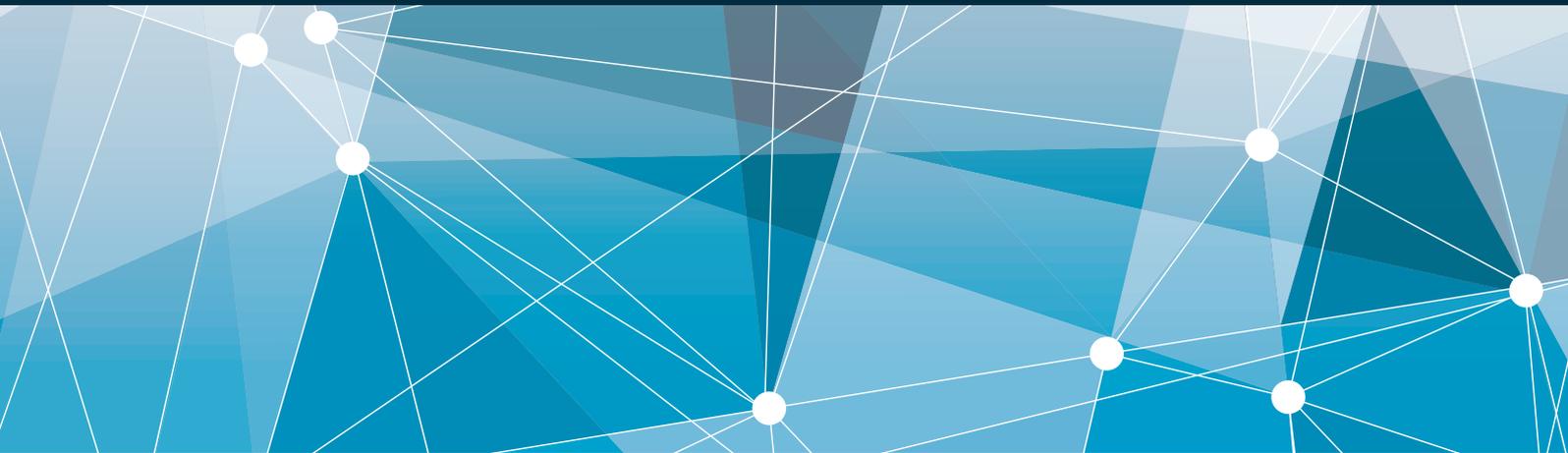


AJAP

AUSTRALIAN JOURNAL OF ACTUARIAL PRACTICE | VOLUME 2



**Actuaries
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The Australian Journal of Actuarial Practice (AJAP)

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The Australian Journal of Actuarial Practice is published by
The Institute of Actuaries of Australia
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ISSN 2203-5354

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FROM THE EDITOR

As populations age and more individuals in our society become dependent on retirement provisions, two of the key questions we face as a society are these: How do we fund for retirement, and how should the risks associated with retirement savings be shared between the various stakeholders? As actuaries, we have a major role to play in this space, not only due to our long history in the retirement and life insurance areas, but also because of our ability to take an unbiased and long-term view of the risks associated with each approach to funding for retirement.

While the editorial policy of the AJAP is to publish papers of interest to practitioners, and on occasions to publish papers from events of interest to members, this edition arises from a conference around the actuarial issues involved with the management of retirement and social security systems that will be of interest to members.

Dr Colin O'Hare PhD, FIA, FIAA, FHEA
EDITOR



GUEST EDITOR DR ANTHONY ASHER

This volume arises from a discussion I had with Rob Brown at the International Congress of Actuaries in Cape Town in 2010. At one of the sessions, we had made separate presentations on the design of social security retirement systems (SSRS) and used rather different criteria to judge their success. We therefore raised the possibility of some debate in the future. The 2013 Pension Benefits and Social Security (PBSS) Colloquium in Lyon provided a good opportunity to continue the discussion.

PBSS colloquia provide an ideal venue for a hard and careful review of the major actuarial challenges in retirement systems, and how they can best be addressed. The colloquia provide these opportunities because they draw together a wide range of member actuaries, with a variety of perspectives, general expertise in the field, and detailed knowledge of the mechanics of schemes operating in their own countries. Few other fora offer these opportunities.

In recruiting participants for this volume, the debate seemed to resolve itself into a discussion of balancing mechanisms in SSRSs. Balancing mechanisms are more obviously required by defined benefit (DB) schemes (whether funded or not), but defined contribution (DC) schemes cannot really be said to have solved the problem. The market prices of the underlying assets provide an automatic balancing mechanism that is widely regarded as unsatisfactory, in that it potentially exposes pensioners to excessive risk. Notional defined contribution plans (NDC), which lie between pure DB and pure DC schemes, also have some form of automatic balancing mechanism, but with greater need for judgement. In Australia, the Age Pension, Medicare and the long-term care packages available to retirees and the elderly also require mechanisms to ensure affordability over the long term.

The balancing questions are fraught, not just because they can be technically complicated, but also because they affect the personal financial interests of every adult. The role of actuaries is in unravelling some of the complexity by quantifying costs and benefits, and identifying trade-offs. In order to do so, actuaries have to not only make the mechanics comprehensible, but also identify competing interests, being particularly aware of their own personal interests (both as participants in, and servants of, the system) and of the interests of the decision makers.

Australians are perhaps prone to believe our fully funded DC scheme is superior to unfunded DB schemes, but this belief is not shared universally. Two different sets of 10 myths about the funding question were published independently about a decade ago. They are summarised – and contrasted – in the following table.

Table 1: Two sets of 10 myths about retirement funding

Orszag & Stiglitz (2001)		Barr (2002)	
Macroeconomic myths			
Myth 1	Individual accounts raise national saving.	Myth 4	Funding reduces public pension spending.
Myth 2	Rates of return are higher under individual accounts.	Myth 9	Funding is better if real returns exceed real wage growth.
Myth 3	Declining rates of return on pay-as-you-go systems reflect fundamental problems.	Myth 1	Funding resolves adverse demographics.
Myth 4	Investment of public trust funds in equities has no macroeconomic effects.	Myth 3	There is a direct link between funding and growth.
		Myth 2	The only way to pre-fund is through pension accumulation.
		Myth 5	Paying off debt is always good policy.
		Myth 7	Funded pensions diversify risk.
Microeconomic myths			
Myth 5	Labour market incentives are better under individual accounts.	Myth 6	Funded schemes have better labour market incentive effects.
Myth 6	Defined benefit plans necessarily provide more of an incentive to retire early.	Myth 8	Increased choice is welfare improving
Myth 7	Competition ensures low administrative costs under individual accounts.		
Political economy myths			
Myth 8	Corrupt and inefficient governments provide a rationale for individual accounts.	Myth 10	Private pensions get government out of the pensions business
Myth 9	Bailout politics are worse under public defined benefit plans.		
Myth 10	Investment of public trust funds is always squandered and mismanaged.		

Another myth that may be added is the view that funded pensions lead to more developed capital markets, and better allocation of capital. The Kay (2012) review of UK equity markets and long-term decision making questions these assumptions. Indeed, doubts about the desirability of the current size of the financial sector seem to be growing: Philippon and Reshef (2013) suggest that “the available evidence at present suggests that at the very high end of financial development, rapidly diminishing social returns may have set in”.

The papers in this volume take some different perspectives on the issues. Rob Brown addresses some of the myths and suggests that DC schemes do not really resolve the problems with DB schemes, given the “costs in terms of increased risks to individuals, and the possibility that governments will be required to provide additional support to those who are left in relative poverty”.

In my paper, I attempt to respond by highlighting the importance of justice, and the

unfairness of many DB schemes, and how they can be manipulated by powerful interest groups. DC schemes at least avoid these pressures, although tax concessions provide plenty of scope for lobbying benefits.

The paper by Krzysztof Hagemeyer and John Woodall looks particularly at the vulnerability of the less powerful when benefits are reduced under fiscally necessary, but unbalanced, mechanisms. This emphasis on coverage and adequacy of the minimum benefits is an important contribution from the International Labour Organization.

Two papers look specifically at the mechanisms of automatic balance mechanisms (ABM). The paper by Frédéric Gannon, Stéphane Hamayon, Florence Legros and Vincent Touzé is an adaptation of a paper presented at the colloquium, and provides an example of how an ABM can be developed that applies to both benefits and contributions – in their case to the French SSRS. Doug Andrews' paper was not presented at the colloquium, but analyses some single figure population ratios and their application to the Swedish ABM particularly.

Finally, Chris Daykin has written about the contribution that the Actuarial Association of Europe (previously the Groupe Consultatif) has played in the ongoing debate about the sustainability of pensions in Europe. Chris is chairman of the sub-committee set up in 2012 specifically to develop an actuarial contribution to this issue, and he reports on the significant progress of the last two years. The initiative provides a positive illustration of how actuaries can become involved in public policy involving SSRS.

The papers in this volume touch on only a few issues, and there is much work to do. One field is the need to project the interaction between growing longevity, increasing retirement ages and the changing costs of long-term care. Another is the design of funded benefits, the impact of ageing on capital markets, and the governance of the investments. Yet another is the design of unfunded benefits, their funding and assuring fairness between different groups, including future generations. The challenges to the profession are to ensure that the necessary data are collected; that our technical abilities are adequate to the analysis of the data; and that we have the integrity, courage and wisdom to intervene in the public debate on the side of the public good.

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My thanks go to CEPAR (The ARC Centre of Excellence in Population Aging and Research) and the Institute of Actuaries of Australia for financial support for this project.

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The essence of social security: debunked myths

DR ROBERT L BROWN



Dr Robert L Brown

ABSTRACT

This paper attempts to focus the definition of a social security system at its most basic level. In doing so, it discovers a number of truths:

1. PAYGO systems are not remarkably different from fully funded systems.
2. Fully funded systems are not demographically immune.
3. Fully funded systems are not inherently more stable than PAYGO systems.
4. The least desirable design for a social security system is an individual account defined contribution system.

KEYWORDS

social security, pension reform, individual accounts, defined contribution, pay-as-you-go

1 THE ESSENCE OF SOCIAL SECURITY

A social security system is a social contract that sets out a process to decide what proportion of a country's gross national product (GNP) its elderly residents can consume without any need for them to be in the active workforce. That is its essence on a macroeconomic level. On a microeconomic level it is a process to decide what proportion of each worker's output will be transferred to its non-active elderly population for their consumption.

That is the entire story. But, once understood, many myths underlying today's social security policies and procedures are easily seen to be just that: myths. The primary myth that this paper will debunk is that a fully funded social security system is different to, and better than, a pay-as-you-go (PAYGO) social security system.

2 HOW DIFFERENT IS PAY-AS-YOU-GO (PAYGO) SOCIAL SECURITY FROM FULLY FUNDED SOCIAL SECURITY?

First, I acknowledge that there are an infinite number of alternatives available between purely PAYGO social security and fully funded social security. However, by analysing what is true at these two polar-opposite end points, we can resolve most of the supposed funding issues for systems in between.

I will start with PAYGO financing. Note, first, that social security needs to be financed; it does not necessarily need to be funded. It is beneficial to have its financing be sustainable and stable. To do that may require carrying some reserves, but pure PAYGO financing is a perfectly acceptable method of running a social security system.

The Samuelson-Aaron theorem explains that, in a PAYGO system, contributors earn a rate of return equal to the growth g of covered wages, while contributors in funded systems earn the rate of return r on accumulated pension assets (Samuelson 1958; Aaron 1966). Funded pension systems are thus more efficient, in a Pareto sense, and provide higher pension payments for the same amount of contributions made if and only if $r > g$. Otherwise, PAYGO financing is preferable to funded pension schemes.

In a pure PAYGO system, workers forgo a certain amount of take-home pay (which is a proxy for ability to consume) by making contributions to the social security system. Assume a worker makes a 10% contribution. This is absolutely the same as saying that a worker takes one half day of production and passes it over to a retired person, who is normally not in the workforce, for them to consume. The money (representing goods and services not consumed by the worker) comes in in the morning and goes out

in the afternoon, allowing for an equal amount of consumption of goods and services by the retired.

The workings of a fully funded program are slightly more complex, but virtually equivalent. Again, let's assume our system will require 10% contributions from each worker to be fully funded. What happens in this system is that the worker forgoes 10% of his or her consumption in order to buy assets (such as stocks and bonds) that are kept in some safe retirement savings vehicle managed by some financial institution (the assets may be housed internally to the social security system). When the worker retires, he or she then liquidates these assets, turning them into money to buy goods and services for consumption.

If we look at this through a microscope, on a certain day there are workers searching for owners of assets (such as stocks and bonds) who want to sell them for money and there are retired people who have assets (such as stocks and bonds) who are looking for buyers so as to get money to purchase goods and services.

Almost identically to the PAYGO system, the worker forgoes consumption (say 10%) and transfers money to a retired asset owner to acquire his or her assets. The retired person, in turn, sells certain assets to get money to pay for consumption. But the end result is identical. The worker gives up consumption of a certain portion of his or her output and transfers the right to this consumption to a retiree.

But a question may remain: "Do fully funded social security systems increase national savings and thus assist economic growth?" There is a large volume of classical literature addressing this question (see, for example, Aaron 1982; Rosa 1982; Barr 1987; Orszag & Stiglitz 2001). There is no conclusive evidence to support the contention that a fully funded social security system increases national savings. There are two reasons for this. Because individuals save through their social security system, they may offset those dollars of savings by saving fewer dollars in individual investments. The result is no net gain in national savings. Or, if the "savings" in the social security systems are offset by increased government borrowing (which might be expected to the extent that the assets of the social security system are government bonds) then, again, there is no increase in national savings.

This latter outcome deserves greater scrutiny. Consider a system where the financing is to have assets backing the system (either partially or fully funded), but those assets are all government bonds. Now if the country's economy is a closed economy and workers are the source of both social security contributions and income taxes, then the impact on the economy of this country and its workers/ producers is identical, both as to the size of the demand for money (that is, forgone consumption) and as to the timing of that demand

for money, whether the system is purely PAYGO (no assets), or fully funded, or any alternative in between. It is only a choice of whether the worker pays taxes out of his or her right pocket to buy back the bonds as needed or whether the worker pays contributions to the social security system out of his or her left hand pocket. But the systems are identical both as to the size of the cash flow demand and its timing.

Now, if the country's economy is not closed, and if any assets of the social security system are invested offshore (which may be difficult politically), then the different funding mechanisms will not be absolutely identical, but will be so close as to only be of academic interest. Further, investing offshore creates currency exchange risk.

Finally, if one is wise in investing offshore, one needs to find a country that does not have the same demographics as the home country. Otherwise, you have not mitigated the "funding" risk.

3 ARE FULLY FUNDED SOCIAL SECURITY SYSTEMS DEMOGRAPHICALLY IMMUNE?

It is well known that PAYGO social security systems come under financing pressures when the ratio of retirees to the labour force rises. We can see clearly from the previous discussion, however, that fully funded social security systems are not demographically immune, as many argue. The aged dependency ratio (often defined as the ratio of those aged 65 and over to those aged 20 to 64) is as important to a fully funded system as it is to a PAYGO system. This ratio will decide how easy or hard it will be for workers to find persons trying to liquidate assets (for example, those 65+) or alternatively how easy or hard it will be for the retired to find buyers of their assets (for example, those 20–65) and thus how much gross national product will be effectively transferred.

The fallacy that fully funded systems are demographically immune can be explained through the fallacy of composition. An analogy will illustrate this nicely. If you are an individual at a concert and your view is blocked, you can see better if you stand up. But, if the entire audience stands up, you are no better off.

To take it to an extreme, if there are *no* workers, then there will be no production of gross national product. There will be no contributions to a PAYGO system, but also no ability to sell one's assets in a fully funded system. In short, there has to be production of gross national product before it can be distributed. Wealth brings high wages; high wages do not bring wealth. Clearly, the best environment for a healthy and sustainable social security system is a healthy and growing economy.

To determine the required contribution rate for a PAYGO social security system, the rate of return that

is implicit in the calculation is the growth rate of the earnings base on which contributions are paid. This is effectively the rate of growth of the economy that, in turn, is a function of the growth rate of the labour force and the rate of productivity growth.

To determine the required contribution rate for a fully funded social security system, the rate of return that is implicit in the calculation is the rate of return on invested assets. Thus, there will be times when a PAYGO system will require lower contribution rates than a fully funded system (most of the second half of the last century), and there will be times when a fully funded system will require lower contribution rates than a PAYGO system (most of the first half of this century). There is nothing to say in advance that one system is inherently cheaper than the other.

4 WHICH SYSTEM IS MORE VOLATILE: PAYGO OR FULLY FUNDED?

As was mentioned above, a goal for a sound social security system is sustainable and stable financing. By definition, are PAYGO systems more stable or are fully funded systems?

The volatility in the cost/contributions for a fully funded system will be the volatility of the rates of return of its invested assets. As we all know, volatility of investment returns is very high. They are not highly predictable even in the relatively short run (such as ten years). They are certainly not predictable over the longer range.

The volatility in a PAYGO system is the size of the wage base upon which contributions are made. This in turn depends upon a number of demographic and economic variables including the following: fertility rates, migration rates, labour force participation rates and productivity improvement rates. Life expectancy (mortality rates) was not included in this list because it has an equal impact on either or both PAYGO and fully funded systems. Further, many systems have now introduced automatic balancing mechanisms, which make these systems highly immune to changes in life expectancy (for a deeper discussion of automatic balancing mechanisms, see Vidal-Melia 2012).

I would suggest that it is easier to predict the cumulative impact of the above list of demographic and economic variables, long term, than to predict rates of investment returns into the future. The above demographic variables can be influenced somewhat by government policy, and some shifts in one variable can offset unexpected moves in another variable (for example, using migration to replace non-births).

But, to conclude, there is nothing inherent in a system being fully funded that makes it more stable or more predictable than a PAYGO system.

5 WHAT SHOULD WE AVOID IN DESIGNING A SOCIAL SECURITY SYSTEM?

We have discovered that there is not as much of a difference between PAYGO social security systems versus fully funded systems as the myths would lead us to believe.

That being the case, is there any reason why we should care how the systems are financed?

The answer is a definite *yes*. One must design the financing of the system in a manner that absolutely minimises the expense burden on the participants and the risks that the participants must assume. That being the case, it becomes rapidly apparent that the worst way to design a social security system is as an individual account defined contribution system.

Such a system makes a number of assumptions that are patently false.

1. Workers are capable of optimal investing and asset management.
2. If workers are not capable themselves, then they can purchase asset management at a very low expense ratio.
3. Workers, if given investment fund options, will choose wisely and will also follow a life-cycle model of investing where they slowly move from a high equity portfolio to more fixed income as they near retirement (or, even better, they buy deferred annuities as they near retirement).
4. Workers can buy individual life annuities as a fair actuarial price.

Each of these assumptions is false.

5.1 Workers are capable of optimal investing and asset management

How can an individual worker who has no training or education in business or economics be expected to invest wisely and manage their assets prudently?

As Figure 1 shows, the choice of one's investment portfolio and the timing of the cash flows can clearly have a huge impact on one's standard of living upon retirement.

In Figure 1, we see a replacement rate as high as 90% and as low as 14%. And the only variable is the period over which the individual is working and saving.

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.

That is, the worker has two choices. Invest heavily in stocks and face a level of volatility that is probably unacceptable, or invest more heavily in bonds and fixed-income securities and mitigate the volatility risk, but guarantee a much lower standard of living in retirement.

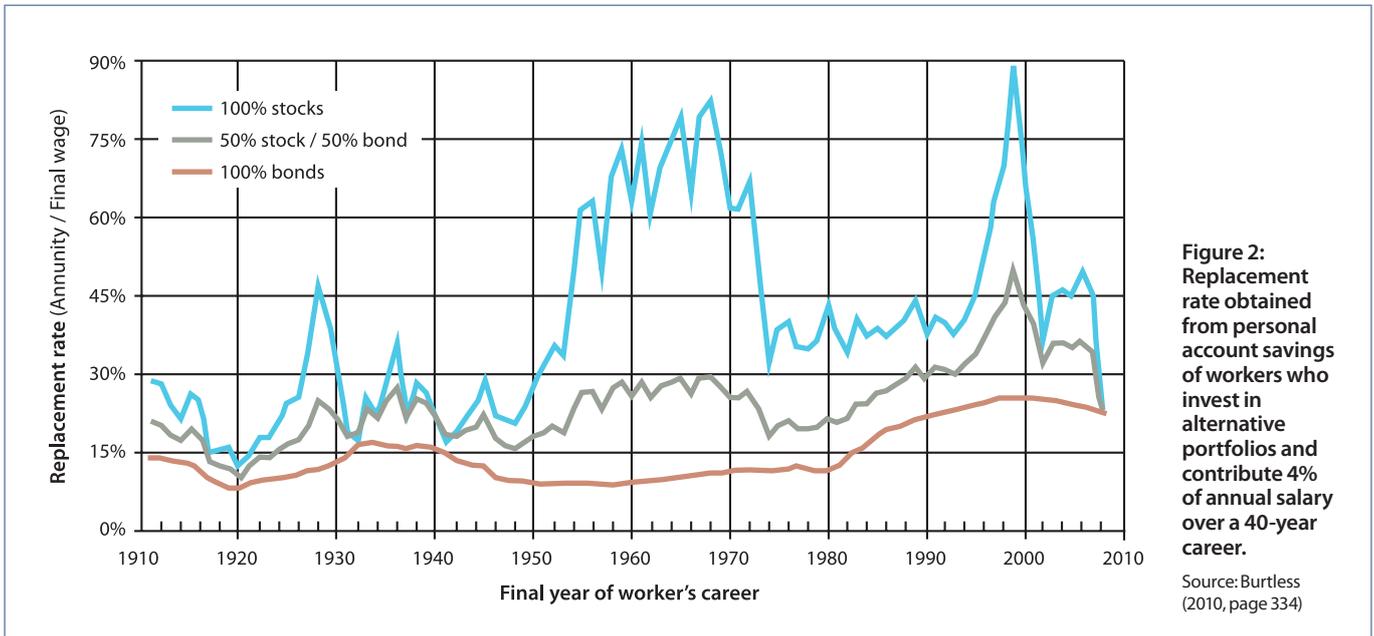
The replacement ratios in Figures 1 and 2 also indicate the impact of the timing risk. This is the risk of being forced to liquidate your assets at depressed values while also buying an annuity when interest rates are low and annuity prices are, therefore, high (as in 2009).

The responsibility of investing and liquidating assets is one for which the average worker has little capability. The literature indicates that if individuals are responsible for managing their own capital accumulation, they do so conservatively and achieve lower rates of return.



Figure 1: Replacement rate obtained from personal account savings of workers who invest solely in stocks and contribute 4% of annual salary over 40-year career.

Source: Burtless (2010, page 333)



5.2 If workers are not capable themselves, then they can purchase asset management at a very low expense ratio

One can legitimately argue that there are professionals who can be paid to manage the funds even in the de-accumulation phase. While that is true, it comes at a high cost. In Canada and the United States, it is not unreasonable to assume that a professional fund manager will charge 2% of assets each year as their management fee. A 2% per annum fee decreases the ultimate retirement fund (assuming a 35-year experience) by 31.7% (Ambachtsheer 2008; Ontario Ministry of Finance 2014).

Looked at in a slightly different manner, Table 1 tracks the impact of investment expense ratios and shows how profoundly they can affect the aggregate pension benefits and working income replacement ratios of retired plan members. The data assume an annual contribution to a plan of \$10,000 over 40 years for a worker making \$50,000 per year.

Even the highly regarded Australian superannuation funds have investment expenses ranging from 1.28% to 1.92% for not-for-profit funds and 2.03% to 2.73% for retail funds. Add to that operational expenses of 0.33% to 0.64% for not-for-profit funds and 0.72% to 1.27% for retail funds and we have results very similar to those from Canada and the United States (Cummings 2012).

Table 1: Impact of investment expense ratios on pension adequacy

Expense ratio	0%	0.4%	1.5%	3%	5%
Accumulated value after 40 years	\$777,000	\$707,000	\$551,000	\$400,000	\$272,000
Annual pension payout	\$45,000	\$41,000	\$32,000	\$23,000	\$16,000
Replacement ratio	90%	82%	64%	46%	32%

Sources: Ambachtsheer (2008). See also Ontario Ministry of Finance 2014.

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. Many studies have also shown that actively-managed funds underperform index funds, even before accounting for the higher fees charged by the former. But broker-sold mutual funds perform worst of all. One estimate is that broker-sold funds underperform average actively-managed stock funds by 23 to 255 basis points a year. The problem is big because the number of people rolling over into IRAs has increased dramatically.

The rollover of balances from 401(k)s to IRAs is extraordinary given that participants are typically passive in their interactions with their 401(k) plans. They rarely change their contribution rate or rebalance their portfolios in response to market fluctuations or as they age. Some households may be attracted by the opportunity to obtain a wider menu of investment options or to consolidate their account holdings. But others may be seduced by advertisements from financial service firms urging participants to move their funds out of their ‘old,’ ‘tired’ 401(k) plan into a new IRA.”

Finally, if we are going to design a defined contribution social security system, at the least it should be run as a large, “collective” fund. This is because size matters.

Table 2: Investment fees by size of pension fund

Size of pension fund	Investment fees for large-cap equities
Individual account	250–300 basis points
\$10 million	60 basis points
\$1 billion	42 basis points
\$10 billion	28–35 basis points

Source: Ambachtsheer (2008).

Further, and importantly, a large collective fund can invest more widely than any individual account, in, for example, private equity or infrastructure. This effectively gives the worker a less risky portfolio.

5.3 Workers, if given investment fund options, will chose wisely and will also follow a life-cycle model of investing where they slowly move from a high equity portfolio to more fixed income as they near retirement (or, even better, they buy deferred annuities as they near retirement)

There is no support in the literature for this contention (see Munnell et al 2013). The more choice of investment funds you give for individual accounts, the more likely it is that savings end up in the default option. In Australia, 80% of participants went to the default investment option. This does not have to be totally negative. For example, in Sweden, which initially (1998) 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.

Nor is there any support in the literature for any evidence that workers use a life cycle approach to the management of their portfolio (Munnell et al 2013).

Finally, buying fair market value life annuities may be very difficult.

5.4 Workers can buy individual life annuities at a fair actuarial price

When we move into the de-accumulation phase, the worker can always manage the longevity risk by buying a life annuity. Simple enough, until we look at the cost, especially given today’s very low interest rates. However, wherever interest rates happen to be at a given moment, a consistent cause of the high price of life annuities is the factor that the insurance company

must include to cover anti-selection (James et al 2008). Anti-selection occurs because the insurance company can never know as much about the annuitant’s health and life expectancy as does the annuitant purchaser (the principle of information asymmetry). Under this principle, workers who know they are in good health are more likely to buy life annuities or to buy larger amounts. Those who know they are in poor health will not buy life annuities at all. Thus, the insurance company must price the annuity assuming a five-star risk. That is, they price the annuity assuming the purchaser will have very high life expectancy.

In most countries, there is no risk classification for annuities (except in extreme cases where the seriously ill or injured can purchase what are called “settlement annuities”). Thus, the norm is that a coal miner who is over-weight and smokes pays the same price for an annuity as a non-smoking schoolteacher who jogs. Clearly they are not equivalent risks, but they are normally priced as if they are both five star applicants.

This has the further negative impact of being regressive. There is clear data (Brown & Prus 2004; Whitehouse & Zaidi 2008) that wealthier people live longer. And this is not because healthier people make more money. It is because of the stability, socialisation and access to care that result from wealth and education (Brown & McDaid 2003). Thus, if you charge the same rate for all life annuities, you are penalising 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 annuitise at retirement.

If the worker does not buy an annuity, effectively, they must self-annuitise. That is, they must determine a program of income withdrawal that is optimal for them. Depending on their desire to leave a bequest (which we ignore here), they will want to take out the maximum income possible without creating the threat of outliving their assets. That is a lot to ask. Who knows their life expectancy? And covering your life expectancy is not enough. One would be wise to cover at least one’s life expectancy plus one standard deviation. So, if workers want to be sure that they will not outlive their assets, they make conservative withdrawals. That means they live at a lower standard of living than is necessary. If they take more aggressive withdrawals, then they increase the probability of outliving their assets and thus becoming dependent on friends and family, or on government programs for their continued consumption. (This should also be a concern to taxpayers who will pay those welfare benefits.)

Individual accounts also create a counter-cyclical macroeconomic bias. For example, when a country’s economy is hot, one would expect asset values to rise,

but also one would expect increased demand for labour. When the stock market is hot, holders of individual accounts will see an ability to retire and will then leave the labour force, exactly what the economy does not want. The reverse holds when the economy cools. Individual account values go down and the account holders see that they must remain in the workforce, just when you would like them to leave (MacDonald and Cairns 2007).

In short, in the case of a 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 accounts social security retirement systems (see Beattie & McGillivray 1995; de Mesa, 1997; Gill, Packard & Yermo 2004; Diamond, 2004; Diamond & Orszag 2004; Sinha & Yanez 2008).

6 CONCLUSION

This paper has attempted to focus the definition of a social security system at its most basic level. In doing so, we have discovered a number of truths.

1. PAYGO systems are not remarkably different from fully funded systems.
2. Fully funded systems are not demographically immune.
3. Fully funded systems are not inherently more stable than PAYGO systems.
4. The least desirable design for a social security system is an individual account defined contribution system.

It is the expectation of the author that many of the points made in this paper will prove to be contentious. By debating a wide variety of viewpoints, it is hoped that one can all arrive at a more complete understanding of the essence of social security.

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Redistribution and capital market impacts of social security retirement systems: principles and scope for actuarial involvement

DR ANTHONY ASHER



Dr Anthony Asher

ABSTRACT

This paper in part responds to Rob Brown's "The essence of social security: debunked myths" in this volume. As in that paper, social security retirement systems (SSRS) refer to arrangements that provide non-labour income to the elderly.

It makes the argument that SSRS need actuarial monitoring and spells out the principles that should inform such monitoring. The first two sections identify and suggest principles for addressing the problematic issues of income redistribution and the impact of SSRS on capital markets.

Section 3 considers the redistribution implicit in defined benefit (DB) schemes, and how actuaries should play a role in making such redistribution transparent in both DB and defined contribution (DC) arrangements.

Section 4 suggests that there is a place for more comprehensive reporting to ensure that the schemes meet their objectives.

The fifth section considers the impacts of all types of SSRS on investment markets. There is an obvious actuarial role in the projection of the effect of demographic changes, and a potentially enhanced role in the governance of the financial system and particularly in much more intensive data collection and analysis.

Section 6 expands on the possible role of actuaries in monitoring SSRS and section 7 summarises and concludes.

KEYWORDS

social justice, defined benefit, financialisation, aging, governance

1 ACTUARIES AND SOCIAL SECURITY RETIREMENT SYSTEMS (SSRS)

Rob Brown argues that the essence of an SSRS is a financial transfer from workers to the retired; that many accepted opinions of the relative merits of funded systems are myths; and that the risks to which members of individual account systems are exposed make these the worst of all systems. But perhaps like democracy, the system that seems to devolve power to relatively incompetent individuals is the worst of all systems – except all the others that have been tried.

Before addressing this question, however, we have to consider the two main sets of issues that can interfere with the essential functions of an SSRS:

- The first is the question of how the redistribution from workers to the retired will be effected – both within and between generations. In defined benefit (DB) funds, benefits are not necessarily distributed proportionately to contributions – whether or not allowance is made for the time value of money. As the distribution does not depend on personal consent, it requires the power of the state, and that power is always open to abuse and should be subject to appropriate oversight. In defined contribution (DC) funds, the redistribution depends on investment choices and the random effects of market movements, creating considerable volatility that raises questions about the suitability of these schemes for providing incomes in retirement.
- The second set of issues relates to the effects of the cash flows on the economy generally and on capital markets particularly. There are potential unintended, and unrecognised, consequences.

These issues are of interest to actuaries as citizens, but members of the profession bear a personal responsibility because of their insights into the mechanics of the systems and an even greater responsibility if they are directly involved in management or oversight. Moreover, the Institute of Actuaries of Australia itself, and in many countries the actuarial professional bodies, recognise their responsibility for the public interest. Professional responsibility goes beyond the scope of our principals' instructions: as with the doctors' Hippocratic Oath, actuaries should be sure that we "do no harm".

The issues at stake are not just technical. Vast amounts of money are at stake in SSRS. Franco et al (2012) record that SSRS absorb more than 20% of GDP in the European countries they investigated. They report different estimates of the present values of these liabilities as multiples of GDP. It is difficult to approach

discussion of such large amounts dispassionately, even more so as everyone is personally affected financially in one way or another.

However complex and politically fraught, it can be argued that the management of SSRS is just the standard actuarial problem writ large on a national scale. Balancing inflows with outflows, and allocating costs and the benefits equitably are fundamental to all insurance and retirement schemes. Where the arrangements are subject to the discipline of a competitive market, questions of equity can be replaced by those of economic viability but, in both cases, the use of the actuarial toolkit is invaluable.

The role of actuaries is to develop and implement the techniques required to manage financial security systems. We identify and measure the key driving influences and project them as best we can.

2 REDISTRIBUTION AND JUSTICE

Redistribution is a zero sum game and different parties are likely to defend, or seek to extend, their shares whether or not they are justified in doing so. In arguing their position, parties may appeal to the need for greater equality, more efficiency, a focus on the poorest or for a closer relationship between the value of contributions and benefits (which the economists often call "actuarial equity" – a term that I shall use here). I suggest that reconciling these legitimate, but conflicting, objectives is a function of the principle of justice (or equity). I make a more detailed defence of its application to social security systems in Asher (2010).

In essence, it seems to me that justice requires a balancing of different criteria, which in the context of redistribution are as follows:

- *There should be equality of treatment:* horizontally, in that people with the same characteristics should be treated in the same way; and vertically, in that the treatment of people with different characteristics should be proportional to their differences. Equality of outcomes is desirable because all people are equal.
- People's *needs* for poverty relief or insurance against longevity risks should be considered
- Schemes should be *actuarially equitable*. People who have contributed more have a real claim to higher benefits based on realistic assumptions and fair interest rates.
- Governments should *not interfere* without good cause in any aspect of their citizens' lives, and so compulsory membership of retirement systems needs good justification. Not only should individuals be given as much liberty as possible, the accompanying principle of subsidiarity is

that power should be devolved to the lowest local level consistent with meeting the system's objectives.

- *Efficiency* should also be considered.

Actuaries are not experts in questions of justice or redistribution, and it seems to me that there is a good argument for arguing that these are democratic choices. The other professional experts in this field (philosophers and lawyers, for instance) are, however, less concerned about precise outcomes than about the justice of the process and the need to consider the full range of stakeholders and criteria listed above. Actuaries can use their understanding of the mechanics of SSRS and of other redistributive mechanisms (tax and means tests especially) to inform public debate; as members of the public, actuaries are also entitled to participate (as long as their personal interests are identified and disclosed).

Williams (1997) provides a warning:

There is a regrettable tendency for equity arguments to be conducted within a rhetorical framework in which it appears possible to “do good” at no opportunity cost whatever. It generates a great deal of righteous self-satisfaction for the romantic escapists and it puts economists back in the role of the dismal scientists always stressing the sacrifices, but it does not help the hard-pressed decision-makers who grapple with the issues in real-life every day ... [we need] ... to bring home the fact that giving priority to one group inevitably disadvantages others, a consequence which many advocates of particular equity principles fail to make clear (and they rarely state who will be called upon to make what sort of sacrifice even when they do acknowledge this implication). (128)

Actuaries may have to play the role of dismal scientists: we do need to identify winners and losers.

3 DB BENEFIT RATIOS ARE OPAQUE AND CAN BE MANIPULATED

In particular, the manner in which DB schemes lead to redistribution needs to be explained by actuaries. If actuarial equity is a principle, then it is of some concern that the internal rates of return obtained by individuals in DB schemes are arbitrarily determined. The original rules were often based on simple, and therefore tractable, formulae that were easy to administer in

a pre-computerised environment. It can, however, be suspected that they were adopted because of their being that much more attractive to wealthier and more influential groups of members.

3.1 Longevity

In the first place, wealthier groups live longer and obtain benefits for longer. While Rob Brown is correct that some annuity markets can be criticised in that they do not allow for socio-economic mortality differentials, there is invariably no distinction within private and public DB schemes. Some DC arrangements allow those with lower life expectancies to opt out of the cross subsidies, but at least in the UK, insurers now offer enhanced annuity rates to those with lower life expectancy. The cross-subsidy to the wealthy has long been recognised, for example, in one of Brown's papers (1998), but as he shows, the cross subsidy is often more than compensated by greater social benefits to lower income individuals. I would suggest, however, that the extent of the cross subsidies needs to be continually monitored to ensure that there is no “benefit creep” at the expense of poorer and often less vocal members of the SSRS.

3.2 Different rates of salary increase

Less often recognised is the fact that greater weight is invariably given to later years of income in the determination of benefits. This is not only true for final average schemes, but also for career average arrangements revalued by an inflation rate lower than the average rate of salary growth. Workers from lower socio-economic groups have a flatter wage profile than those with higher incomes, and therefore their contributions to the SSRS at earlier ages have more time to earn a return. The same flatter salary scales apply to those who suffer from ill health later in their working lives. Both groups are not likely to be well represented amongst decision makers and may be not be adequately compensated by other means. Kaye (1985) reports some calculations by David Wilkie, which suggest that just 2% a year increase in salary relative to the average will yield a pension worth 50% more than the average. Coronado et al (2011) find that, under certain assumptions, the US system can be seen as regressive – even with apparently significant non-earnings related benefits.

This particular cross subsidy would appear to need greater monitoring.

3.3 Demographic change

One could design PAYGO schemes so that the ratios between contributions and benefits are based on a more or less constant real return. Notional defined contribution (NDC) funds fall into this category. More frequent are schemes where the contributions or the

benefits are adjusted with demographic change so that the return to each generation is dependent on the rate of growth of the population and changes to longevity. The adjustments to the benefits and contributions – whether based on rules or on ad hoc changes – require some justification. Such justifications require very careful analysis as the changes may otherwise impose unfair burdens on different groups – and give unjustifiable windfalls to others.

One might respond by saying, as Robert Myers (1998) did in a response to Brown (1998), that the rates of return or money's worth ratios are not relevant to the purpose of SSRS, which are to meet economic and social needs in retirement and are based on solidarity. Solidarity is not achieved however by pandering to the interests of powerful groups, nor by exposing the system to structural strains that may require traumatic adjustments.

These arguments apply particularly to contributory DB schemes, but are also relevant to flat-rate schemes such as the Australian Age Pension. They are obviously progressive, particularly if they are means tested, but higher ages of entitlement can significantly reduce the benefits to lower socio-economic groups, who have lower life expectancy.

Whatever the design, regular actuarial monitoring seems to be important to ensure balance and equity.

4 DC SCHEMES ARE VOLATILE

Actuaries can also highlight the random “redistribution” created by DC schemes. While DC arrangements objectively allocate benefits, funds invested in equity markets produce very volatile results. Brown makes the case that the range of replacement ratios provided by DC schemes is extreme. (He shows that they would have varied by a factor of almost 6 over the past century in the US). Cannon and Tonks (2013) confirm this for 16 countries in the OECD over the same period. Both sets of calculations, however, show that investment in equity markets would invariably have outperformed investment in bond markets – sometimes significantly. It could be argued that an economically neutral DB or NDC scheme should give a return on contributions equal to that of government bonds. The benefits of a DC arrangement invested in equities are volatile, but the volatility for the members appears, at first sight, to be almost all on the upside.

A number of economists and others have used these facts to argue for a switch to DC arrangements. Feldstein and Liebman (2002) provide a good summary of the issues and arguments. One underlying assumption is that private markets will allocate capital more effectively and that state control over companies

and investment projects should be avoided if possible. Engelen (2003) suggests that this assumption may be based on a biased and overoptimistic view of the size of the equity risk premium. (See Damodaran (2011) for evidence of considerable overoptimism amongst academic economists in the 1990s particularly.)

The upside of DC schemes can also appear higher because the return on government bonds is often artificially depressed. Reinhart et al (2011) provide evidence that the interest rate on government borrowing has been artificially depressed for a large part of the past century – as part of a strategy of “financial repression” to reduce the size of the debt. Even in normal times, the shorter term government debt held by banks is held largely for liquidity purposes and is not a good measure of the returns on capital in society. Insurers and retirement funds may also hold longer term government debt for regulatory reasons rather than as pure investments, which may also lead to artificially lower returns. Artificially lower returns on government debt helps explain the puzzle that equity risk premiums are too large to be explained by risk aversion alone.

Even allowing for overstatement, the arguments for investment freedom and the existence of a smaller but still significant equity risk premium do suggest that there is some role for DC arrangements with investment freedom. Brown, however, makes the widely accepted point that too much freedom – particularly if members are encouraged to have individual accounts – leads to higher expense charges and poor investment decisions. This provides an argument for group schemes with sensible investment default options, which actuaries are well placed to design.

The issues of balance and equity that are important in DB schemes are replaced in DC arrangements by issues of expense management and investment strategy, as well as issues of financial planning, such as how much to save, the retirement date and annuitisation. These calculations are not peculiarly actuarial skills, but actuaries are already providing advice to the managers of these funds and are able to make important contributions in this area. The area does appear to be underserved currently and could perhaps benefit from the development of international actuarial standards.

5 MANDATORY CONTRIBUTIONS DISTORT INVESTMENT MARKETS

Actuaries can also comment on the direct and indirect impacts of demographic change on all the pillars of an SSRS on investment markets. A purist free market view would hold that both PAYGO and compulsory funded schemes distort what would be a natural capital market. In the absence of any government SSRS, people

would “naturally” save something for retirement and one would expect the development of a capital market to allocate these savings to the most productive investments. Those holding this free market view would argue that free capital markets will allocate investments more efficiently than if they are “crowded out” by large PAYGO schemes or distorted by artificially stimulated funded schemes (either by compulsion or tax concessions). One could go further and argue that the latter may also distort efficient markets by driving asset prices up and investment returns down.

Few take this purist view; those who do adopt the view appear to be acting as lobbyists for a larger financial sector. McGrattan and Prescott (2013), for instance, argue that all taxes on investment income distort decision making and should be removed, that a mandated retirement system with investment freedom would “dramatically increase welfare” and that:

Mandatory savings and insurance, which are not binding for most people, do not distort the labor-leisure and intertemporal consumption choices. They do overcome some of the problem of some people not saving for retirement and relying on others for financing their retirement consumption.

Underlying their model, and all the arguments for more funding, are highly speculative counterfactual assumptions about the productivity of investment – assuming that investment returns in private markets will greatly outperform those in the public sector and that members of SSRS will be able to enjoy such benefits. These assumptions are obviously debatable and would appear to be coloured by an interest in a large financial sector. As participants in the sector, actuaries should be aware of the possibilities that our views can be similarly coloured.

5.1 Financialisation

Financialisation has been used to describe this colouring of the thinking of those in the financial sector particularly. A number of observers see the increased funding of SSRS as contributing artificially to the growth of the finance industry, both ideologically and in its share of GNP. Outside the finance industry, this growth can be viewed with some alarm as contributing to both inequality of incomes and greater speculation. Engelen (2003) refers to “increasingly speculative behaviour and a frantic search for financial innovations”.

Adair Turner (2009), then head of the UK Financial Services Authority, takes a similar view:

And, indeed, there are good reasons for believing that the financial industry, more than any other sector of the economy, has an ability to generate unnecessary demand for its own services – that more trading and more financial innovation can under some circumstances create harmful volatility against which customers have to hedge, creating more demand for trading liquidity and innovative products; that parts of the financial services industry have a unique ability to attract to themselves unnecessarily high returns and create instability which harms the rest of society.

There are other reasons for the growth of the financial sector, and there is evidence that it contributes to economic development. Philippon (2007), for instance, finds the growth arises rather from technological change in that growing firms in the last 30 years have required more outside capital than previously. Rajan and Zingales (2003) document the contribution to economic development, but note the role of private interest groups in obstructing development in various countries of the world during the twentieth century. They suggest that one way of limiting the power of such interest groups is “public awareness of the hidden costs of policies that ostensibly promote economic stability”.

More concerning is the relatively invisible interconnectedness of the system. Vitali et al (2011) were able to investigate the ownership and control of 43,000 trans-national companies and found that “nearly 4/10 of the control over the economic value of TNCs in the world is held, via a complicated web of ownership relations, by a group of 147 TNCs in the core, which has almost full control over itself”. The authors point out the systemic risks that such interconnectivity creates.

Results like theirs also suggest the possibility of using the greater data processing power now available to better understand and monitor these risks. Farmer et al (2012) “outline a vision for an ambitious program to understand the economy and financial markets as a complex evolving system of coupled networks of interacting agents”. They envisage the use of existing micro-data on households, firms and particularly financial transactions (that is currently not collected and analysed) to produce forecasting tools.

It seems to me that the implementation of such models is a function for which actuaries are well suited. While the models would be expensive to create and run, the costs would be a minute proportion of the amounts being managed, and would justify the creation of significant actuarial functions within government.

This is a long-term goal. In the shorter run, further thought can be given to ensuring greater diligence in the selection of investments and involvement in the corporate governance of the companies in which shares are held. Clark and Hebb (2004) suggested that there was a trend towards more active retirement fund management, and there may be evidence that this continues with social and environmental investment management principles being more widely accepted. Actuaries involved in the governance of retirement schemes will inevitably be involved. The Institute of Actuaries of Australia has identified “investment advice and governance” as a core capability of actuaries (Actuaries Institute, 2012), and so there would seem to be support for further development of actuarial skills and standards in this area.

5.2 Demographic distortions

Another distortion that can arise is that, as a population begins to age, more assets are acquired by pension funds, pushing asset prices higher but if aging continues and populations decline, dissaving reduces asset prices – as recognised most clearly in Japan (Nishimura 2011). It seems that, when there is an abundance of savings, interest rates can be pushed very low and even become negative, so requiring more savings (certainly with matched DB schemes), creating further pressure on interest rates.

This distortion can arise whether the SSRS is funded or not. If contributions exceed benefits temporarily, then the surplus needs to be disposed of or invested. This applies obviously to privately managed DC accounts. If a PAYGO scheme has no explicit assets, then the surplus is effectively lent to the state. Governments may use the money in a variety of ways. In both cases, there is a risk that the additional money is being taken from consumption and used to bid up the price of existing assets.

Is such an increase in asset prices unavoidable? Birkeland and Prescott (2007) calculated that the assets required to fund a SSRS in the USA (with its particular demographic and investment conditions) would amount to some five times GNP. This would exceed the available assets and so would require government to create additional government borrowing – or create asset price inflation. McGrattan and Prescott (2013), however, argue that if one includes the value of all land and intangible business assets, the asset markets are big enough to provide the base for a funded SSRS.

Whatever the theoretical possibilities, it does seem that funded schemes are vulnerable to capital market enthusiasms that can throw unseemly amounts of money at poor investments. This has been illustrated recently by the technology bubble at the turn of the century and the US housing bubble and its associated derivative

instruments that led to the financial crisis of 2008.

Would the excesses be mitigated if there were greater awareness of the size and direction of demographically governed cash flows? It does seem to me that, in a scientific age when we have a huge capacity to measure and manage, our national economic statistics could be considerably more detailed. They should include projections of cash flows into and out of the financial sector, allowing governments and investors to adjust their capital spending accordingly.

6 PRACTICAL ACTUARIAL INVOLVEMENT IN MANAGING A SOCIAL SECURITY SYSTEM?

Brown is not alone in recommending a multi-pillared SSRS that includes a provision for basic needs and then some, and perhaps an element of investment smoothing for wealthier pensioners who participate in an earnings-related component.

Such a system must include a centrally managed component if it is to have a redistributive function. The argument of section 3 is that the redistribution needs to be subject to intense and ongoing scrutiny, or it will be exploited by powerful groups. I doubt whether it is possible to develop rules for redistribution that will be robust enough not to require adaptation over time. It seems necessary to determine, regularly, the extent of the redistribution, both within and between generations, and the relative needs of beneficiaries and contributors. I believe government treasury or finance departments should have the actuarial resources to collect the necessary data, and perform and publish these analyses. Franco et al (2012) make some suggestions as to how this could be done, although they do not seem to appreciate that most of the work is of a largely actuarial nature. International standards could perhaps be developed to set out appropriate assumptions and methodologies.

The standards could perhaps include the following. Measurement must be regular: triennially before computers, but now at least annually. The reports should cover:

- the total liabilities of the SSRS (all relevant elements, or pillars) and the accrual over the past year – in total and by distinguishable groups of beneficiaries
- the assets available to pay the liabilities, including future contributions, government taxes, and the “returns” over the period
- the “emerging costs”, showing the extent to which cash flows from the assets (including envisaged sales) will meet cash flows from the liabilities
- changes to the assumptions and models, and the

financial implications for future estimates

- cross subsidies from one group to another, with a particular focus on the labour market distortions created (such as restrictions on changing jobs and countries, and early or late retirement).

Actuaries make recommendations as to levels of premiums, contributions or benefits that must necessarily be determined to the last cent, in the full knowledge that another approach might lead to significant differences in the recommendation. Such recommendations require actuarial judgement: there is no single right answer, but there are possibly a number of wrong or bad answers. Failure to address how scheme deficits should be corrected, by setting out appropriate balancing mechanisms, is almost always wrong.

The system should also include a funded DC element. The principle of subsidiarity would suggest that such funds should not be centralised, but should be large enough to obtain benefits of scale. Actuaries would play a different role in such DC schemes. It seems to me that they could provide a regular report to the management of the fund that would cover:

- financial soundness and the management of risks
- an analysis of investment performance and expenses
- whether discretionary allocations of expenses and benefits were appropriate
- whether member products and services and particularly financial advice remain appropriate.

7 SUMMARY AND CONCLUSION

It seems to me that the myths to which Brown refers are based on mistaken assumptions and ideological pre-conceptions compounded by private interests, from which we need, as actuaries, to identify and distance ourselves.

As professionals with a deep understanding of the mechanics of SSRS operation and a commitment to the public interest, actuaries can and should provide all stakeholders with clear information that allows them to make informed decisions about questions of redistribution, whether intra- or inter-generationally. For DC funds, particularly, we should be advising on the management of personal risk and on financial performance.

The impact of SSRS on investment markets is in some ways an unintended by-product of their operation rather than their design. Actuaries could play a greater role by carrying out more detailed projections of cash

flows and in their governance in investment markets.

In all these cases, modern technological developments do allow for the collection of more micro-data that can be fruitfully used to create better actuarial models. Governments should contribute to the collection of such data and should develop actuarial capabilities to perform these analyses.

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How should the adequacy of pension coverage be balanced against financial sustainability?

DR KRZYSZTOF HAGEMEJER AND JOHN WOODALL



Dr Krzysztof Hagemeyer



John Woodall

ABSTRACT

In recent decades many countries have “reformed” their contributory pension schemes, generally strengthening the links between benefit entitlements and the contributions paid over members’ working lifetimes, but primarily seeking to (re)balance them financially, in the face of strains arising from unfavourable labour market or demographic conditions. The result has been reduced benefit entitlements and levels of coverage, however assessed. The impact has been felt, particularly, by those with shorter, broken careers (due for example to longer spells of unemployment, precarious employment, or family care responsibilities) and with low levels of lifetime earnings. Countries have introduced “automatic” mechanisms which reduce benefits, but without countervailing mechanisms to prevent them from falling below poverty levels. Questions arise, therefore, as to how the adequacy of coverage and benefit levels may be secured, how the non-contributory elements of pension systems should be strengthened, and how much room is left to policy discretion when automatic balancing results in socially undesired outcomes. The issues are illustrated for the countries of the European Union, where extensive statistical data are available, but are important globally. Clearly, actuaries must play a key role in providing the relevant quantitative assessments, and some questions are raised as to the nature of their responsibilities.

KEYWORDS

social security, pensions, poverty, demographic ageing

1 INTRODUCTION

The question of the adequacy of pension provision, through the very diverse national systems existing in countries around the world, is one of great topical interest. Concern is all the greater in the light, not only of the financial and economic strains experienced in many countries in recent years, but also of the longer-recognised issues of increasing longevity and later retirement ages. In addition to the responses reflected in national policy-making, various regional and global agencies have sought deeper understanding of the issues; such initiatives include the establishment of the Working Group on Ageing Populations and Sustainability (AWG) of the EU Economic Policy Committee, the Working Group on Ageing (SPC-WG-AGE) of the EU Social Protection Committee, and a Task Force convened more recently by the Actuarial Association of Europe (AAE).

This article has its origins in the Social Security Department (now re-named the Social Protection Department) of the International Labour Office, where the subject of the adequacy of pensions, along with other benefits provided under social security, has been one of fundamental concern for many decades.¹ At the invitation of the Pension, Benefits and Social Security (PBSS) branch of the International Actuarial Association, in advance of the Colloquium held by the IAA in Lyon, France in June 2013, Krzysztof Hagemeyer authored, and John Woodall presented at the Colloquium, a paper on this topic, entitled “How to balance adequacy of coverage with financial sustainability?” (Hagemeyer 2013). In large part, the present article comprises the substantive material of that paper, while taking the opportunity to make, it is hoped, a few small clarifications.

In addition, however, the opportunity is also taken to add some observations reflecting the context in which the paper was discussed at the Lyon Colloquium. Taken together with a number of other papers, a significant theme of the presentation was the way in which actuaries, whose role in establishing the financial balance of a pension – or any other social security scheme – is obviously crucial, conceptualise their responsibilities to the multiple stakeholders in such schemes. It is hoped, thus, to provide, without suggesting concrete answers, some food for thought in relation to these issues.

The views and perspectives presented here are those of the authors personally, and should not be attributed to the International Labour Office or any other organisation; responsibility for any factual errors also rests, of course, with the authors.

2 RETIREMENT

To provide a suitable context for the discussion, we begin with some observations concerning “retirement” – noting that discussion of this topic may well be somewhat confounded by the sometimes indiscriminate use of the word to mean both the event of ceasing work on a particular day and an individual’s non-working status subsequently.

The designs and shapes of pension systems are usually the result of social contracts, which may be more or less explicit in character. Societies will effectively define their objectives through an ongoing debate, itself explicit or implicit, around a set of questions, of which the most important are likely to be:

- What should “retirement” (as a status) represent: simply the condition of a person who is no longer able to work, or rather a well-deserved period of rest after working life (or a more nuanced concept)?
- At what age, after how many years of a working career, or after what proportion of a “full” (expected) working lifetime should retirement (as an event) typically take place?
- What level of guarantee is seen as appropriate by the society as a whole as representing an adequate guarantee to its elderly members – should this comprise only the alleviation of poverty for those unable to support themselves, a (defined) minimum income for all residents in old-age, or a guaranteed level of replacement rates (as a proportion of pre-retirement income)?
- What is the desired degree of solidarity (noting that pension provision is necessarily redistributive to a greater or lesser extent) in financing the incomes of retired persons; should individuals save for themselves, should the younger generation(s) support the elderly as a matter of principle; or should support be restricted to a minimal level for those unable to save enough for their own needs?

Evidently these questions, particularly the last, reflect the broad issue as to the balance of responsibilities between an individual and the society to which she or he belongs. To the extent that answers can be crystallised, they are likely to differ significantly in the context of different societies, at different times, and in differing economic conditions.

The divergent answers generate a range of institutional and financing solutions; different countries can and do establish pension systems with, for example,

¹ Before his recent retirement, Krzysztof Hagemeyer held the post of Chief of Policy, Governance and Standards Branch in the Social Protection Department of the ILO in Geneva. John Woodall has also retired from the staff of that Department.

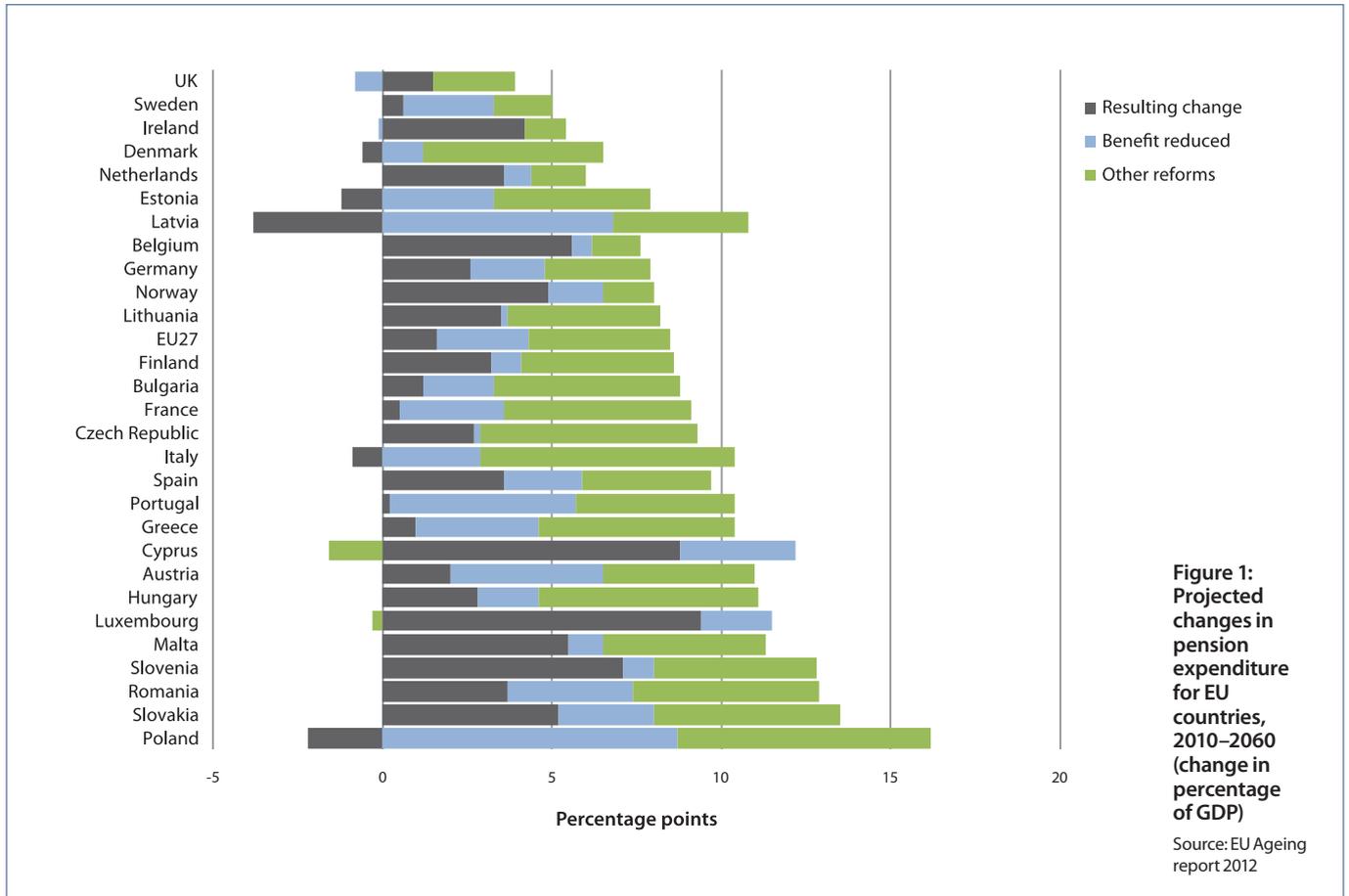


Figure 1: Projected changes in pension expenditure for EU countries, 2010–2060 (change in percentage of GDP)
Source: EU Ageing report 2012

different shares of mandatory and voluntary provisions, different combinations of defined-benefit and defined-contribution elements, and different degrees of prefunding; and, not of the least significance, different shares of responsibility allocated to the public and private sectors.

In any country, the resulting social contract will be subject from time to time to revision as demographic, economic and social circumstances, not to mention public perceptions and attitudes, change. During their more than 100-year long history, social security pension systems have evolved with such changing circumstances and attitudes. It can be seen, however, that one constant feature of successful reforms is the need for a wide degree of public acceptance for revision of the prevailing (explicit or implicit) societal agreement. Reforms that fail to recognise the prevailing perceptions of what is fair and adequate usually fail.

From time to time the scope of such social contracts may cross borders and result in international social agreements. These may take the shape of international standards, such as the Conventions

and Recommendations of the International Labour Organization,² the European Code of Social Security (originally promulgated by the Council of Europe in 1964), or agreements of more specific scope, such as those developed within the European Union.

3 THE DYNAMICS OF CHANGE

Demographic developments have, of course, significant impacts on social security systems in general and pension systems in particular. Figure 1 presents results of the projections of pension expenditure until 2060 for all EU member countries.

Figure 1 is derived from the calculations made for (and to be found in) “The EU Ageing Report 2012”, and showing projected changes in expenditure (measured as a percentage of each country’s GDP) between 2010 and 2060. The changes are decomposed into different factors, purely demographic or of other types, driving the level of pension expenditure. Some factors, notably increases in demographic dependency ratios, serve to

² With respect to pensions in particular, the most important of these instruments of the ILO are Convention No. 102 of 1952, concerning minimum standards in social security, and in combination Convention No. 128 and Recommendation No. 131 of 1967, concerning Invalidity, Old-Age and Survivors’ Benefits.

drive up expenditure, while others, such as reductions in benefit levels or increases in actual retirement ages (mainly policy-determined), act to reduce costs. The length of the bar to the right of the origin for each country represented in the graph shows the expected increase in pension expenditure (in GDP percentage points) in the absence of reforms or other policy changes. It thus shows the potential impact – quite dramatic – of demographic change. The element of each bar coloured blue shows the extent to which the potential increase is reduced by planned reductions in benefit generosity – thus the impact of the extent to which the increase in benefit amounts over the projection period falls behind projected increases in productivity. In a few cases, the total magnitude of the policy-related changes is more than sufficient to offset the expected no-change cost increases, so that the post-reform net increase is negative, and in these cases the blue element of the bar is partially hidden by the black element.

The elements of the bars coloured green show the reduction of potential expenditure increases arising from other changes in the pension system design, in particular increases in retirement ages, and expected changes in the labour markets, notably increased labour force participation at all ages.

The net balance, after allowing for these factors, is shown by the size of the black part of each bar in Figure 1, representing the net projected increase in pension expenditure. These increases, thanks to the reforms undertaken, are smaller in all, and much smaller in most, of the EU countries than those that would result from demographic changes if not counterbalanced by various policy responses.

Inspection of these results certainly does not support the notion that the ageing of populations in European Union member countries is leading to any unavoidable “pension crisis”. On the contrary, most of these countries have adopted reforms which, at least to a large extent, counterbalance the cost effects of expected demographic change. This has been achieved more fully in some countries than others; in some countries there are obviously still things to be done and further reforms pending. It should be noted, also, that the analysis predates some further developments that have taken place in certain countries in which the financial crisis has had the largest impact, such as Greece and Cyprus. On the other hand, and as noted above, Figure 1 shows that there is a group of countries in which the combined effect of the reforms to pension accrual (“blue” elements) and other factors (“green” elements) exceeds the “base case” expected increase, resulting in ratios of pension expenditure to GDP which may in fact *reduce* over the period to 2060, as shown by negative residual values (“black” elements of the bars). In this sense it may be suggested that, if the ostensible objective of reforms is to

address the results of demographic change, it is likely in some cases that those which are undertaken may in fact overshoot their targets.

4 IMPLICATIONS REGARDING BROAD ADEQUACY

It is a valid question as to whether the results suggested by these projections will actually materialise. Some of the projected results are highly sensitive to assumptions of increased labour force participation and later retirement, and may not fully materialise if changes in labour market and other conditions diverge from those expected. In the case of reforms that rely mostly on reduced future benefit levels, there may be future political obstacles: when people realise that the pension systems are failing to deliver levels of protection which they perceive as adequate and fair, reversal of at least some of the reforms should be expected.

On the one hand, it is evident, as seen above, that reforms can actually achieve sustainability, in the sense that increasing expenditure on pensions can be controlled, despite demographic changes. On the other hand, it is also evident that the reform agenda may result in a high level of downward pressure on future benefit levels, and the question arises to what extent these benefit levels, much lower than today, will be accepted in the future by actual or prospective pensioners as adequate. Adequacy and sustainability must be seen as two sides of the same coin.

Figure 2 presents a visualisation of the projected changes in future replacement rates of the public pension schemes in the European Union over the period from 2010 to 2060. The countries that are located on the graph below the 45 degrees line are those where the expected replacement rates are decreasing, and the distance of the point representing each country below that line provides an indication of the severity of the impact on replacement rates of the reform process. Again we should note that the most recent reforms in certain countries badly hit by the financial crisis are not reflected, or at least not fully so, in the analysis. In some countries the expected decrease in replacement rates seems quite significant.

Replacement rate targets have long been a key feature of pension scheme design, and it would be desirable to quantify the adequacy of provision against one or more benchmarks expressed in such terms. Accordingly, both the social security Conventions of the International Labour Organization and the European Code of Social Security demand that national pension systems (possibly comprising several schemes) should deliver replacement rates of at least 40% of pre-retirement earnings when an individual

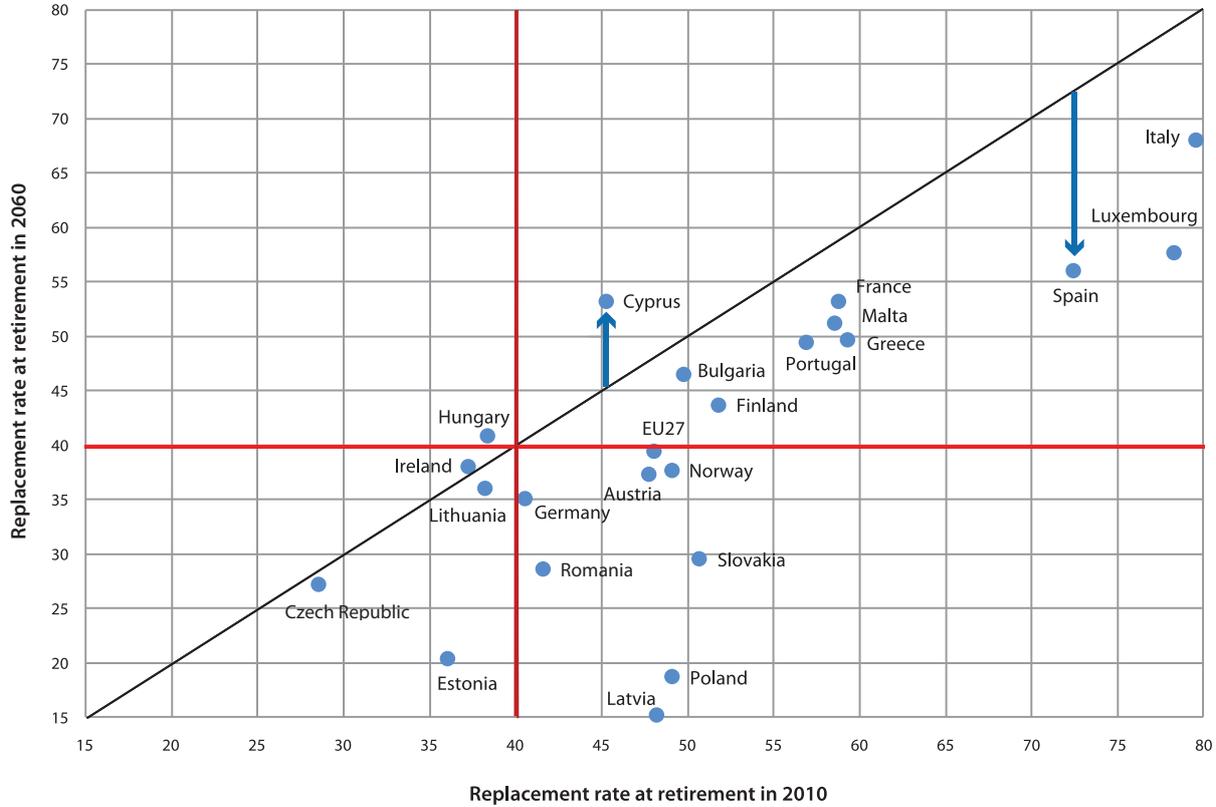


Figure 2: Average replacement rates at retirement in public pension schemes in 2010 and projected for 2060 (selected European countries)
 Source: EU Ageing Report 2012

has paid contributions for 30 years (equivalent to an annual accrual rate of 1.33 per cent):³ systems should be designed in such a way that, even if benefits are “capped” for those with relatively high earnings, this standard should be met for all those who have earnings lower than the prevailing average. From Figure 2 we can see that public pension systems in some countries are already inadequate to provide such replacement rates at present, and in a number of others are likely to fall behind that target by 2060, even for those contributing for longer than 30 years.

Whether or not the target replacement rate of 40 per cent represents an appropriate benchmark in relative terms, it is important also to consider how effective pension benefits at this level can be in obviating poverty in old age. It is not easy to make such an assessment on

a global basis, owing to, among other things, the wide range of national poverty lines.

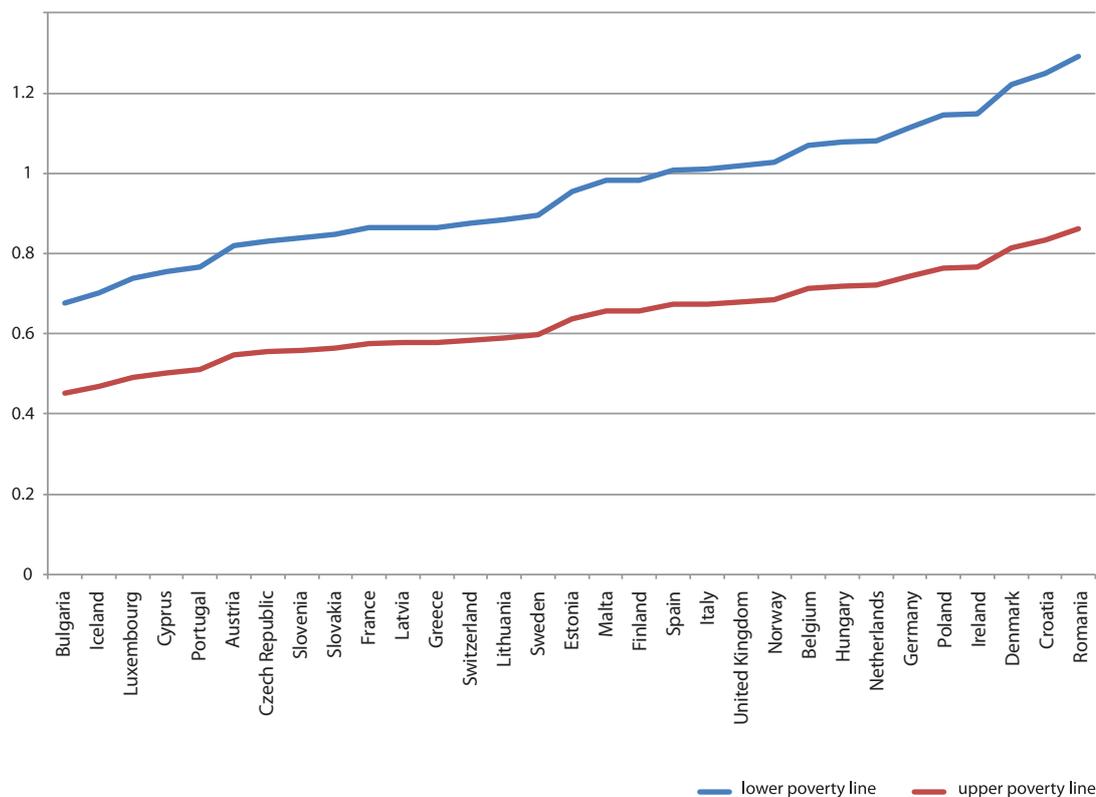
The recent results, for reference year 2010, from the “Structure of earnings survey” conducted four-yearly by the Statistics Office of the EU, EUROSTAT,⁴ revealed that in 2010 17% of employees in the European countries (more than 21% per cent of women and over 13% of men) had earnings below a “low-earnings” threshold, defined for this purpose as two-thirds of median earnings. The highest proportions of low-wage earners were in Latvia (27.8%), Lithuania (27.2%), Romania (25.6%), Poland (24.2%) and Estonia (23.8%), while the lowest were in Sweden (2.5%), Finland (5.9%), France (6.1%), Belgium (6.4%) and Denmark (7.7%).

The EUROSTAT data allow us to estimate the proportion between a hypothetical social benefit

3 The International Labour Organization’s Convention No. 102, the Social Security (Minimum standards) Convention of 1952, sets this minimum, and countries that have ratified the Convention must undertake, in principle, a binding commitment to ensure that the required minimum level is enshrined in national law. As at mid-2014, 50 countries have ratified the Convention. Convention No. 128, the Invalidity, Old Age and Survivors’ Benefits Convention of 1967 (albeit ratified to date by only 16 countries) sets a somewhat higher standard, requiring that an individual who contributes for 30 years should receive a pension of at least 45 per cent of pre-retirement earnings, that is, an annual accrual rate of 1.5 per cent. Countries which have not ratified these conventions are not legally bound in the same way, but the fact that the Conventions have been adopted in plenary sitting by the ILO’s 180-plus member countries means that they can be considered to represent a strong global consensus on best practice.

4 A description of the scope of this survey and arrangements for access can be found at: <http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/ses>

Figure 3:
Proportion
of target
minimum
pension (40%
replacement
rate) realised
for retirees
at lower
and upper
thresholds for
low earnings



Source: Authors' calculations based on EU Ageing Report 2012

providing a 40% replacement rate calculated on the basis of earnings at the level of the “low-earnings” threshold and different relative risk-of-poverty thresholds for single persons as used in the EU: a “lower” threshold of 40% of median income and an “upper” threshold of 60% of median income. Figure 3 shows the result.

It is clear that a 40% replacement rate (the C102 benchmark) is insufficient to prevent poverty at the upper poverty threshold in any of the EU countries, not only among those with large numbers of low-earners. Moreover, the same is true for the majority of countries in relation to the lower poverty threshold. In only 12 countries do those at (but not much below) the low-earnings threshold have the prospect of avoiding poverty as so defined at the “lower” relative level.

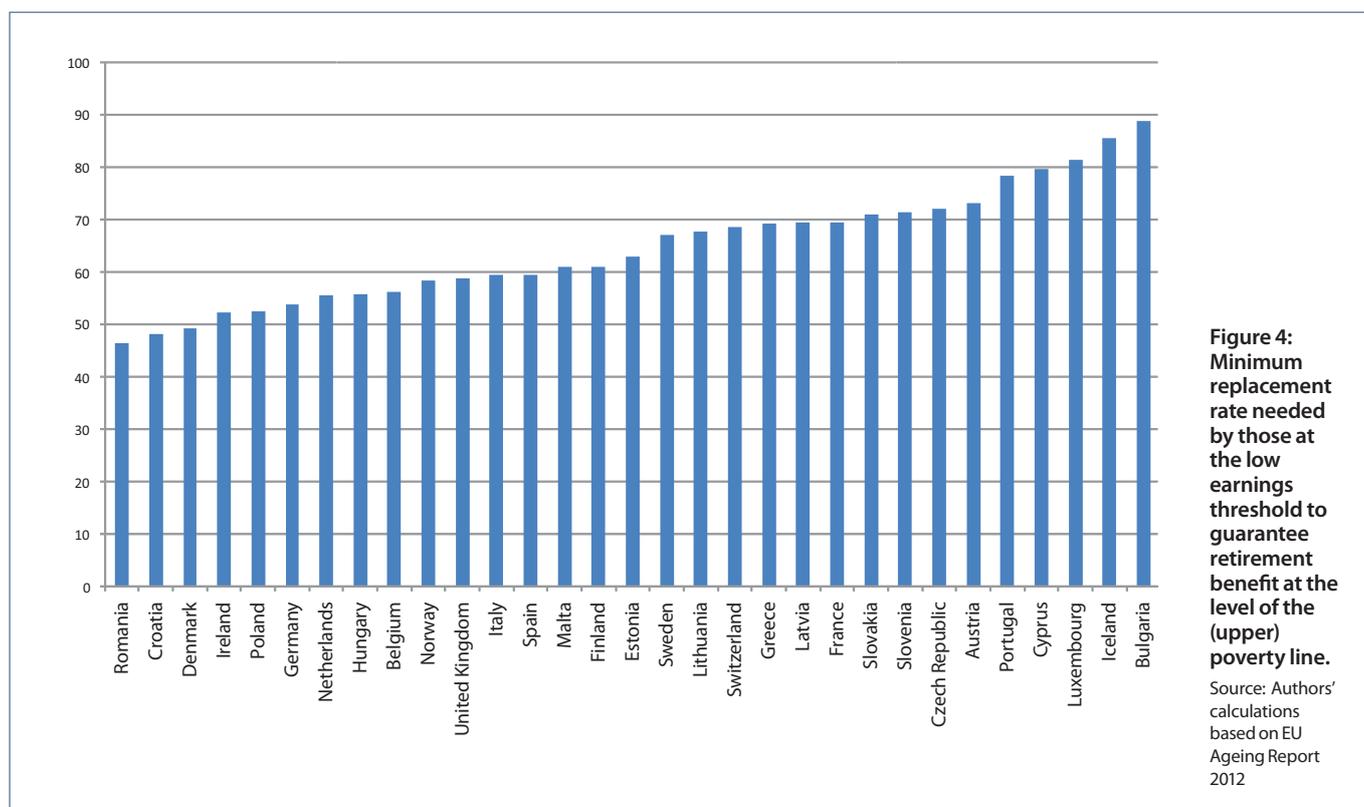
It is illuminating to ask, also, a reverse question: what would be the minimum replacement rate which would guarantee that those with specific earnings levels receive benefit income above the poverty line? As Figure 4 shows, those who spend most of their careers with earnings at the level of the low earnings threshold would need, depending on the country, replacement rates between 50 and 90 per cent (while those with earnings even lower would, of course, need even higher replacement rates).

The existing international standards in social

security (both International Labour Organization Conventions and European Code of Social Security) are constructed in such a way as to ensure as far as possible that those with lower earnings and shorter careers are not disadvantaged (relatively) by the design of pension schemes (Hagemeyer 2009).

In the “old-fashioned” defined-benefit social security pension schemes, redistributive benefit formulas (usually combined with flat rate components or their equivalent) guaranteed such higher replacement rates for low wage earners. Today, many countries have removed those redistributive formulae, introducing instead either defined-contribution (DC) or “notional” (for some commentators “non-financial”) defined-contribution (NDC) components, or converting defined-benefit (DB) schemes to a purely earnings-related structure. In this situation, the securing to low-wage earners of benefits that would keep them out of poverty can be achieved only by strengthening minimum benefit provisions (a matter in which most countries have to date fallen short), in general through some form of non-contributory minimum income guarantee.

In summary, it is clear that an early outcome of recent reforms of contributory pension schemes has been the reduction of replacement rates, notably for



those with lower earnings and with shorter, broken careers. The extent to which the contributory elements of national pension systems adequately meet the needs of this relatively vulnerable group of people (in which, proportionately, women are markedly over-represented) is deteriorating.

In a number of countries, pension reforms have included the introduction of various automatic or semi-automatic mechanisms intended to react to changing demographic, economic and labour market conditions, and to modify certain scheme parameters (notably those defining directly or indirectly the rates of pension accrual) to bring expenditure into closer balance with revenue. Analysis shows this to be true both of the reforms in countries that have introduced so-called notional defined contribution (NDC) schemes (Latvia, Italy, Sweden and Poland) and also some other reforms implemented in many OECD countries (see Hagemeyer 2012). Thus we see, at the core of the public tiers of the pension systems, schemes that are (as previously) financed on a pay-as-you-go (PAYG) basis, but now purely earnings related, in which pension amounts are calculated on the basis of (adjusted) earnings from the whole of an individual's career contribution record.

5 IMPLICATIONS REGARDING ADEQUACY FOR INDIVIDUALS

For an individual, the "outcome" of participation in a pension scheme is measured in terms of the benefit amount and the degree to which income from work before retirement is replaced by a pension at retirement (the replacement rate). From this perspective, different reform approaches *may* have equivalent outcomes, whether the mechanism of calculation is that of DC, NDC, DB, or based on a "point" system.

The use of adjusted lifetime earnings or contributions as a basis for calculating pensions (specifically the "career average" approach to pensionable earnings) generally reduces the resulting pension levels and replacement rates – in comparison with those defined-benefit schemes (of the "final average earnings" type), which exclude from pension calculations earnings from the early, low-earning stages of work careers, or earnings from other low-income periods in individual careers.

Such reduction of pensions is not uniform and has substantial redistributive effects. The "losers" are, of course, all those who, in particular at the early stages of their careers, have low earnings and, perhaps, haphazard earnings patterns. It is easy to show that pension outcomes depend not only on the total amount of earnings, and thus contributions paid during the

whole work career, but also on the timing over the career course of the receipt and payment of those earnings and contributions respectively. A person having a constant stream of earnings over the course of her or his whole career will receive a higher pension and higher replacement rate than another having the same (unadjusted) sum of lifetime earnings and total overall contributions into the scheme but who started earning (by comparison with the first person) and paying contributions after a delay of several years. From an actuarial perspective, of course, this is an obvious consequence of the differing time-values of contributions, but the relevant magnitude of the effect may be much less evident to policy-makers and other stakeholders lacking that perspective.

Such differential outcomes can have important implications, perhaps increasingly so, in relation to young people entering the labour force. Those who delay the start of work and their contribution career in order to achieve higher education levels may have the resulting loss in future pension compensated by higher earnings at a later stage of their careers, but only if the returns from this investment in human capital are high enough. On the other hand, it is increasingly the case that for those who at young ages struggle to find formal employment and for whom – if they have employment at all – it is usually of a precarious character, it is indeed unlikely that such compensation from higher earnings at later stages of their careers will be sufficient to repair their pension expectations. Similarly, the labour market will not (in general) compensate the “lost” earnings of those (mostly women) who, having to care for children (or other family members), spend significant periods out of work, or on parental leave, or working part time.

At a scheme level, it is possible to compensate for the pension deficits of these kinds, through appropriate measures in the scheme design to allow credits for contributions “missed” in defined circumstances. Such a design feature should be particularly easy to implement in the setting of an NDC scheme, and indeed some such allowance is made in each of the four EU countries that have schemes of this type included in the above assessments. It must be said, however, that these schemes – with to some extent the exception of Sweden – effectively compensate only a small part of the loss in future pension entitlements for most individuals.

It is well understood that NDC pension schemes, in a similar way to not only funded DC but also to any DB earnings-related scheme where pension calculation is based on adjusted whole-career earnings, translate differences in earnings in the labour market into differences in pensions. It is less well understood that these differences may actually be amplified, with the result that relative differences in pension levels as between individuals (notably, but by no means only,

between men and women) may be greater than the relative differentials in pre-retirement earnings.

Discussion of the redistributive aspect of pension systems leads naturally to the consideration of relative equity. In the version of this article presented at the Lyon Colloquium in 2013, reference was made to the need for the investigation “of the redistributive features of [these] allegedly ‘actuarially fair’ schemes more closely (whatever the notion of ‘actuarial fairness’ may actually mean)”. This was not intended as an altogether throwaway remark, but it is clear, particularly in the light of the context and scope of other papers presented at the Colloquium, that this aspect of pension provision deserves much closer attention, and the opportunity is taken to add to this article an additional section which may offer some pointers as to the possible direction of such a discussion.

There is of course no controversy in the observation that returns on individual contributions paid over the “contribution career” will differ depending on the time distribution of the amounts paid in. At the same time, particularly in the case of schemes operated through pay-as-you-go financing, actual contributions are paid to a “common pot” and thus it may happen (or be perceived) as the end result that members with relatively low earnings are effectively subsidising the pension benefits of those with higher earnings. More research is needed into how different distributions of earnings over working careers relate to final pension amounts before claims can be substantiated that “horizontal equity”, fairness and transparency are, or are not, served through redistribution, particularly in NDC and similar PAYG schemes.

One way in which policy-makers have sought to secure the financial sustainability of reformed pension schemes has been to build into the design of these schemes strong economic incentives for members to contribute more for longer and to delay retirement. Scheme designers have sought to provide such incentives through sufficiently positive links between the duration and amounts of contributions to be paid and – noting that the age of retirement is being increased in many countries – the resulting pension levels.

Unfortunately, incentives to work longer may be undermined in reality by a range of non-pension related factors determining whether and how long individuals can or do stay in employment. These factors include, among others, overall labour market demand and prevailing unemployment rates; the state of health of older workers (determined to a large extent by working conditions during their working lifetimes); individuals’ family situations (not least the need to care for sick family members); workers’ productivity (reflecting perhaps the extent to which they enjoy opportunities to participate in the kind of life-long learning needed to keep up with

changing technologies); and the attitudes and choices of employers (see ILO 2013). Despite the provision of what may be intended as strong incentives, older workers may in fact be forced out of the labour market and left in poverty with insufficient pensions. It is also becoming increasingly obvious that, even in an NDC scheme, there is a need to adjust pension ages upwards, and this may necessitate the adjustment of minimum *legal* retirement ages, if employers prove reluctant to keep older workers in employment (or invest in their training), knowing that at any moment they can take the decision to retire.

Some argue that the adequacy of benefit levels should be a matter of personal choice, with individuals choosing for themselves the age of retirement (beyond a publicly fixed minimum age), or should even be allowed to retire whenever they may individually decide that their pension balances are adequate. In the framework of PAYG-financed schemes (and perhaps beyond), this may lead to negative selection. The result may, moreover, be a situation when only the well-off have a realistic option to retire, while the less well-off may be compelled, in effect, to work until they die.

6 REDISTRIBUTIVE ASPECTS OF PENSION REFORM

It seems that reforms in a range of countries in recent years have, as noted above, removed from benefit formulae the redistributive components, the aim of which was to provide at least some protection against poverty for those with lower earnings and shorter careers. It is obvious that no DC (or similar) pension scheme lacking additional built-in guarantees can ensure that benefits will reach a level of adequacy for all, whatever targets (for poverty alleviation or otherwise) may be set within national policy frameworks. On the contrary, for a given contribution rate and given rate of return, unless scheme members work long enough to match increasing life expectancy, that factor alone will result in falling replacement rates. While such a mechanism of adjustments in benefits can work as an automatic financial stabiliser, this may result in a sustainability trap in the longer term; when promised benefits start to be seen as inadequate, the willingness of members of the schemes to contribute may reduce correspondingly.

The mechanisms now existing to guarantee income security in old age in those countries that have embarked on NDC or similar reforms seem on the whole to be inadequate, and there must be a risk, even in the developed-economy countries, of a resurgence of old-age poverty.

Too often, NDC and similar schemes have been conceived as a means to reduce pensions and encourage members to retire later, on a basis that is automatic,

even if not very transparent. It was expected that the introduction of automatic adjustment mechanisms, within NDC schemes or otherwise, would reduce the need for political intervention, along with that for any associated process of social dialogue, which has, again too often, been seen as a factor delaying necessary decisions. The recent financial and economic crisis has shown very clearly the limitations as to the extent to which reliance can be placed on such automatic adjustment mechanisms in the short term. There is, and there always will be, a tension between long-term concerns and shorter-term needs, and there must be a compromise between the two. The same limitation of the scope of automatic balancing, however, applies to long-term concerns about benefit adequacy – unless we are able to build mechanisms into the system securing not only financial stability but also benefit adequacy, there will be a permanent need for discretionary interventions in the system.

The notion that pension systems can be shielded from political influences is not only unrealistic but also undesirable: pension policy must form a part of any country's overall social policy. What is needed is to ensure that when decisions are taken on a political basis, they are the right ones, balancing shorter and longer term needs as well as balancing benefit adequacy with financial sustainability. A key prerequisite must be to ensure through democratic mechanisms the full participation of each group of stakeholders – workers, employers and government – in establishing the relevant standards and in creating and maintaining the permanent structures through which pension systems may be monitored, verified and adjusted in a responsible way (see Woodall & Hagemeyer 2009).

In this light, it is suggested that a number of recent reforms should be revisited to see to what extent they have “gone too far” – in some cases completely removing the redistributive components, and thus protection of weaker members, from the contributory parts of public pension systems. It is necessary also to consider how to strengthen non-contributory guarantees, which may take a variety of different forms, including the establishment of a basic state pension that may be universal or means-tested, and different forms of contribution subsidies compensating at least partially for careers that are short or broken, due to extended periods of child care, care provided to sick or old members of the family, or due to extended spells of unemployment. Such reviews should be undertaken as a follow-up to the new international labour standard in social security, ILO Recommendation No. 202, concerning national floors of social protection, adopted in 2012, which complements Convention No. 102. The adoption of this Recommendation, virtually unanimously, by all of the member countries of the ILO

implies a strong moral commitment by countries to guarantee, to all resident older persons, basic income security at a level allowing life with dignity.

The focus of the discussion here has been problems in the pension systems of European and other developed countries, notwithstanding that the article has touched on a range of issues of concern to all, globally. It is important to re-emphasise the fact that the global majority of the elderly live outside Europe in developing countries, and that globally the largest and most basic challenge is that the majority of their populations entirely lack coverage. The number of those around the world contributing to any pension scheme at all represents a relatively small percentage, and, among those who are already elderly, only a small minority receives any type of pension (see International Labour Office 2010, 2013). For the majority of the world population, these issues have yet to be adequately addressed, but these countries will not escape the impact of ageing populations, and it is a critical question as to how to develop pension systems that will be both sustainable in the long run and provide coverage for the now uncovered majority.

7 THE ROLE OF ACTUARIES

Earlier, the article touched on the question of whether provision of pensions through schemes of differing architectures and with different balances of contributions and benefits, can be considered to be “actuarially fair”. This expression seems presently to be in vogue, and indeed was included in the list of topics for consideration by the Adequacy Task Force of the AAE. It may be suggested, however, that considerable care is needed in its use. In particular, this is a phrase of the kind that tends to be used with an increasingly wide variety of meanings, at the choice of different writers – usually non-actuaries.

It would certainly be very agreeable to actuaries to be able to present the results of their calculations, or at least a subset thereof, as having the universally authoritative character suggested by the term “actuarially fair”. However, in the first place – in the view of the writers at least – it should be understood that there is little or no scope for presenting results in a way comparable to the accounting concept of “fair value”, defined in International Financial Reporting Standard (IFRS) No. 13 as “the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the

measurement date” (IFRS Foundation 2011). To what extent, realistically, can, say, a pension scheme member commission (on an individual basis) an actuarial assessment of a transfer value or annuitisation proposal in order to enter an informed discussion of such values as calculated by an actuary who may not be seen by that individual as representing their own interests? Of course, scheme members would in general rely on the assessments and advice provided for or through the board of directors or trustees of a scheme, but however well an actuary advising such a board fulfils her or his task and adheres to her or his professional duty of care, it is always likely that the capacity for understanding the results will be unbalanced. Indeed, if, as is not unlikely, the actuary’s fees are paid directly or indirectly by the scheme sponsors (government or employers), it may be difficult, however objectively the actuary approaches the work, for this to be seen by a member or members as being so.

Secondly, it may be suggested that deeper consideration be given to what even actuaries would mean by “actuarial fairness”. Certainly, an actuary is in a position to assess actuarial *equity*, in quantitative terms and in relation to a definite basis of demographic and financial factors. The idea of “fairness”, however, would – in lay terms – generally have wider connotations, not necessarily altogether quantitative in nature. A significant danger seems to lie in the likelihood that actors in the relevant financial space may, by using the expression of “actuarial fairness”, effectively co-opt the authority of the actuary to assert a degree of objectivity that may well be coloured by non-actuarial considerations, and indeed may not be warranted at all.

In the presentation and discussion at the Lyon Colloquium in 2013, it was suggested that the “right” framework in which pension scheme members should be brought into the financial discussions around their scheme(s), on an informed basis, should make reference in particular to the principles of democracy, and of tripartite⁵ social dialogue, noting that at least some of the different interests “around the table” may well be non-transparent. In these circumstances, an actuary has roles to play well beyond that of a financial technician, including those of an interpreter of the financial results, and in some cases as an adviser or counsellor. The scope within which “fairness” is sought, certainly in the case of national, public pension schemes, is determined not only by considerations of actuarial equity, but also, it is suggested, of social justice. While these issues do not change the technical

5 In the context of all of the activities, including technical and advisory work, undertaken by the ILO, “tripartite” means that the respective interests of governments, employers and workers (the last two groups through nationally representative organizations, which in the case of workers would usually be accredited trade unions or federations) should be recognized jointly. In the case of activities in the field of pensions specifically and social security generally, it is arguable that the relevant social security schemes/administrations form a fourth group.

nature of the work the actuary is required to undertake, the environment – in particular that of tripartite social dialogue – and the “wider” role of an actuary in this environment may be unfamiliar to many. In this light it may well be considered a matter of some urgency that actuaries advising pension schemes, particularly in the public sphere, should review the way in which they take instructions from their principals and recognise a certain set of responsibilities in relation to the whole set of pension scheme stakeholders.

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Sustainability of the French first pillar pension scheme (CNAV): assessing automatic balance mechanisms

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ABSTRACT

In this paper, we apply two types of automatic balance mechanism (ABM) to the French first pillar pension system for private sector employees (CNAV). One is based on a tax gap ratio (TGR-ABM) and the other is the smooth ABM (S-ABM) developed by Gannon, Legros and Touzé (2013). Two long-run forecast scenarios over the period 2014–2063 are analysed. The first is optimistic (“benchmark”) and assumes a 4.5% unemployment rate and a 1.5% productivity growth rate in the long run. The second is more pessimistic (“prudent”), with a 7.5% unemployment rate and a 1% productivity growth rate in the long run. For the benchmark (respectively prudent) scenario, a TGR-ABM requires, now and for the next 50 years, a 2.8% (respectively 6.3%) decrease in pensions and a 2.9% (respectively 6.7%) increase in the tax rate. An S-ABM requires, for the benchmark (respectively prudent) scenario, an immediate 1.5% (respectively 3.6%) decrease in pensions and a 1.4% (respectively 3.5%) increase in the tax rate. In the long run (50 years), an S-ABM requires a 4.5% (respectively 9.1%) reduction in pensions and a 4.5% (respectively 9.1%) increase in the tax rate.

KEYWORDS

pension scheme sustainability, automatic balance mechanism

1 INTRODUCTION

The French pension system for private sector employees is based on two pillars. The first pillar is a basic social security plan (*Caisse Nationale d'Assurance Vieillesse, CNAV*). It is a pay-as-you-go (PAYGO) scheme that provides pensions on a defined benefit rule. The pension is proportional to the average wage computed over 25 years ("reference wage"), based on wages bounded by a maximum, called the "social security ceiling" (see appendix). The second pillar includes two additional schemes: ARRCO for all workers and AGIRC for executives. Both pay pensions on a defined contribution rule and are also pay-as-you-go pension schemes. These two pillars are operated under different rules. The CNAV is managed by the social security administration, whereas the second pillar schemes are managed by social partners, but some parameter changes of the complementary pension schemes (for instance, the pensionable age) are directly governed by the social security system.

Significant deficits in these plans stem from the current economic crisis (lower growth combined with higher unemployment). However, these deficits arose well before expected as a result of the ageing of population.

In France, pension reform is subject to a harsh political debate (Blanchet & Legros 2002), which often leads governments to adopt reforms only when they no longer have a choice. These ad hoc reforms (Turner 2009) induce inconsistency in the choice of pension funding. This blurs the planning of their future by different generations of workers because they do not know how their contribution rates and pension amounts will be changed. To tackle this problem, automatic adjustment mechanisms (AAMs) could be implemented, relying on rules (Turner 2009) that define how different pension calculation parameters must be adapted according to changes in observed variables (for example, life expectancy, consumer price index). When these adjustments fail to ensure financial sustainability, it may be wise to follow countries such as Sweden (Settergren 2001; Capretta 2006; Andrews 2008; Vidal-Melia et al 2009; Scherman 2011; Gannon et al. 2013; Sakamoto 2013) and to use an automatic balance mechanism (ABM).

This paper proposes to assess how the use of ABMs could guarantee the solvency of the CNAV.

Section 2 outlines CNAV's financial forecasts up to 50 years. Two scenarios will be analysed, one, optimistic; the other more conservative one. These will mainly be used in order to generate the data required for the second part of the paper.

Section 3 is dedicated to the use of ABMs. First, we present a way to address the issue of long-term credit through the concept of unfunded obligations, such as defined by the US Social Security administration, and the concept of tax gap ratio. Next, two types of ABM are used. One is based on a tax gap ratio (TGR-ABM), the other is an application of the smooth ABM (S-ABM) developed by Gannon et al (2013). Compared with using a tax gap ratio, using an S-ABM allows for a gradual adjustment in the contribution rates and the pension levels. However, the drawback of this implementation is that it distorts the principle of generational equality. In effect, the S-ABM relies on a parameter of public preference for present. That can be viewed as a kind of procrastination.

2 TWO SCENARIOS FOR THE FUTURE OF THE FIRST PILLAR PENSIONS SCHEME OF PRIVATE SECTOR EMPLOYEES (CNAV)

Structurally, two main macroeconomic variables have significant impact on the solvency of CNAV pension scheme: the unemployment rate and the GDP growth rate. We briefly describe the mechanisms at stake and the forecast built on two scenarios.

Unemployment rate (Figure 1a) is usually thought to play a crucial role in financial balancing through the increase in contributions.

This is true in the short run, because receipts increase when the unemployment rate decreases but, in the long run, the net effect may be ambiguous. First, according to the Phillips curve (Phillips 1958), which historically shows an inverse relationship between unemployment and wage increase rates, a decrease in the unemployment rate implies an increase in wages. This, in turn, increases the short-run effect on overall contributions. Second, in the long run, pension liability depends upon careers and, therefore, lifelong wages. Then, pension liability increases as the unemployment rate decreases.

As far as France is concerned, the 2003 reform (see appendix for the details) puts an end to the independence of unemployment insurance and the pension system by stipulating that the surplus of

unemployment insurance (UI, hereafter) adds to the financing of the pension scheme, if required. This introduces a clear and positive relationship between the unemployment rate and the pension scheme balance.

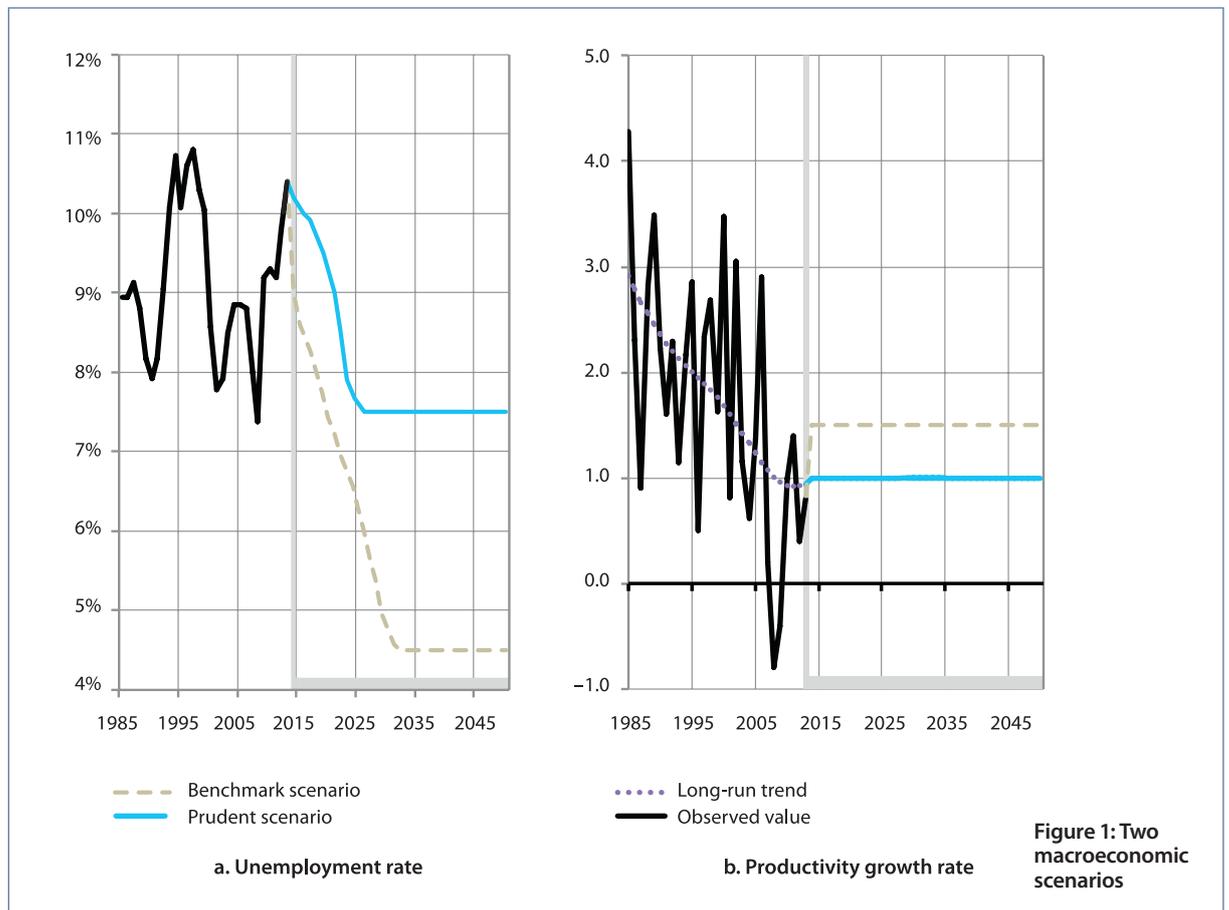
When the unemployment rate falls below a 7% threshold (Hamayon & Legros 2007), the UI generates a surplus. It follows that a wise forecaster should be cautious in his assumption of long-run unemployment rate, to avoid any overestimate of the pension scheme resource resulting from a possible UI surplus.

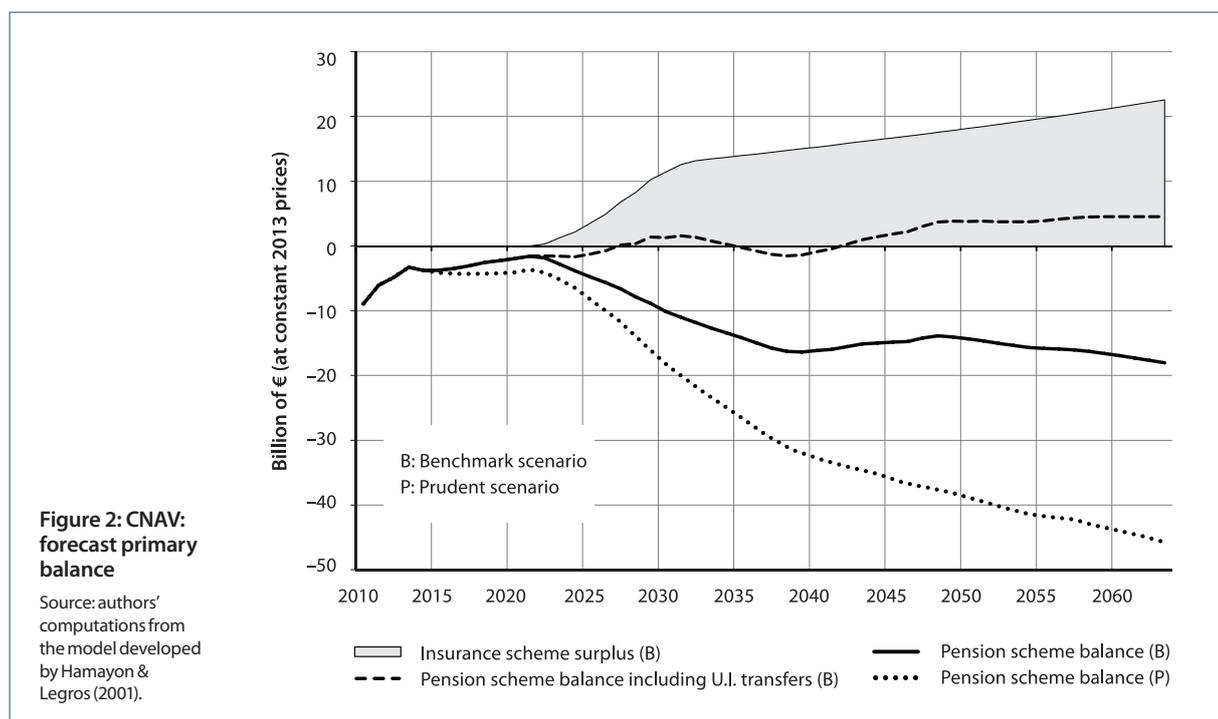
The economic growth rate (Figure 1b) is also a crucial variable. In the case of positive economic growth rate, expenditures grow less than receipts. This is due to the pension rules (see appendix): both the wages used for the “reference wage” and pensions are indexed on inflation and not on the economic growth rate. This indexing rule helps improve the balance of the pension scheme as soon as the nominal economic growth exceeds the inflation rate. The part played by the productivity growth rate (Figure 1b) to balance the pension scheme would be inoperative if the pensions and reference wages were indexed on the nominal wages (supposed to be indexed on the economic growth rate). However, with such a rule, retirees’ purchasing power would be maintained. In other words, when benefits are adjusted according to changes in the consumer price index, retirees pay an implicit tax, thus improving the pension scheme’s financial balance.

This paper suggests two scenarios, simulations of which are based on a demo-economic model with a detailed description of the French pension scheme (Hamayon & Legros 2001).

The first scenario (the “benchmark”) is based upon the double assumption of a low unemployment rate (4.5% after 2030) and a productivity rate of 1.5% (Figure 1). This scenario is similar to the government’s, which is worked out by the Conseil d’orientation des retraites (COR, Pension Orientation Council, which reports to the Prime Minister).

The second scenario tests an alternative and more conservative approach, described hereafter as “prudent” (Figure 1). It assumes that the unemployment rate will progressively reach 7.5% in 2030 and that the productivity growth rate will remain at 1% (as forecast by Artus & Caffet 2013). These different assumptions appear in Figure 1 showing that the “pessimistic” alternative scenario is directly determined by trend observation.





The results (Figure 2) are twofold and, of course, highly contrasted. First, the impact of the unemployment rate is confirmed. In the benchmark scenario (with a low unemployment rate), the sharp decrease – less than 7% – in the unemployment rate after 2020 leads to a large transfer from the unemployment insurance scheme towards the pensions: this transfer reaches 2.2 points of UI contribution, or 18 billion constant euros (B€).¹ The overall deficit of the pension scheme is nearly nil after 2020.

Second, in the case of a lower economic growth (and higher unemployment rate), the situation is far more pessimistic. The higher unemployment rate prohibits any transfer from the UI towards the pension scheme. The deficit of the basic pension scheme reaches 14.4 B€ in 2050.

Figure 2 summarises the results. In the benchmark scenario, the decrease in the unemployment rate allows a significant transfer from the UI towards the pension scheme (11.5 B€ in 2030 and 18.2 B€ in 2050), which pushes up the balance from the continuous bold line to the dotted one. In the “prudent” scenario, due to a higher unemployment rate, the transfers between the UI scheme towards the first pillar pension scheme are nil and the balance remains highly negative throughout the considered period.

Reading from these forecasts, our simulations provide both receipts and expenditures of the pension regime, to be used in the next section.

3 IMPLEMENTING AUTOMATIC BALANCE MECHANISMS

We define hereafter two central concepts to evaluate the long-run insolvency of the pension system: the “unfunded obligations” and the tax gap ratio. These measures are then used to build two examples of ABMs.

3.1 Evaluating long-run solvency

3.1.1 Notations

In this paper, for sake of simplicity, we present a non-stochastic approach to ABMs. All our computations are based upon given forecast values of receipts and expenditures. That means that the estimated adjustment variables must be considered as forecast values for the current period. That also means that these variables will have to be revised as the forecasts will adjust with time.

At the current period ($t = 0$), forecast expenditures at time t are expressed by EXP_t with:

¹ Hereafter, B€ will denote billion constant 2013 euros.

$$EXP_t = E_0 \left(\sum_{j \in \Omega_t^R} P_{j,t} \right) \quad (1)$$

with Ω_t^R a set of retirees at period t and $P_{j,t}$ the pension paid to each individual j .

Forecast receipts at time t are expressed by REC_t with:

$$REC_t = E_0 \left(\tau_t \times \sum_{i \in \Omega_t^E} w_{i,t} \right) \quad (2)$$

with Ω_t^E a set of employees at period t , $w_{i,t}$ the annual sum of monthly wages – below the Social Security ceiling – paid to each individual i and τ_t the payroll tax rate.

3.1.2 The concept of “unfunded obligations”

The US Social Security administration defines the concept of “unfunded obligations” (denoted UO hereafter) as:

“the excess of the present value of the projected cost of the program through a specified date over the sum of: (1) the value of trust fund reserves at the beginning of the valuation period; and (2) the present value of the projected non-interest income of the program through a specified date, assuming scheduled tax rates and benefit levels.”

At the current period $t = 0$, the unfunded obligations compute as follows:

$$UO_0 = \sum_{t=1}^T \frac{EXP_t - REC_t}{\prod_{i=1}^t R_i} - F_0 \quad (3)$$

where $R_t = 1.02$ is the interest factor at time t (2% is the value of the real interest rate), with $F_0 = 0$ (see appendix) the financial amount accumulated in the retirement reserve fund.

The forecast horizon plays a crucial part (Figure 3). With the exception of the scenario including UI transfer, the further the horizon, the more the calculation involves a significant number of deficit periods: the initial capital requirements increase with the length of the solvency guarantee.

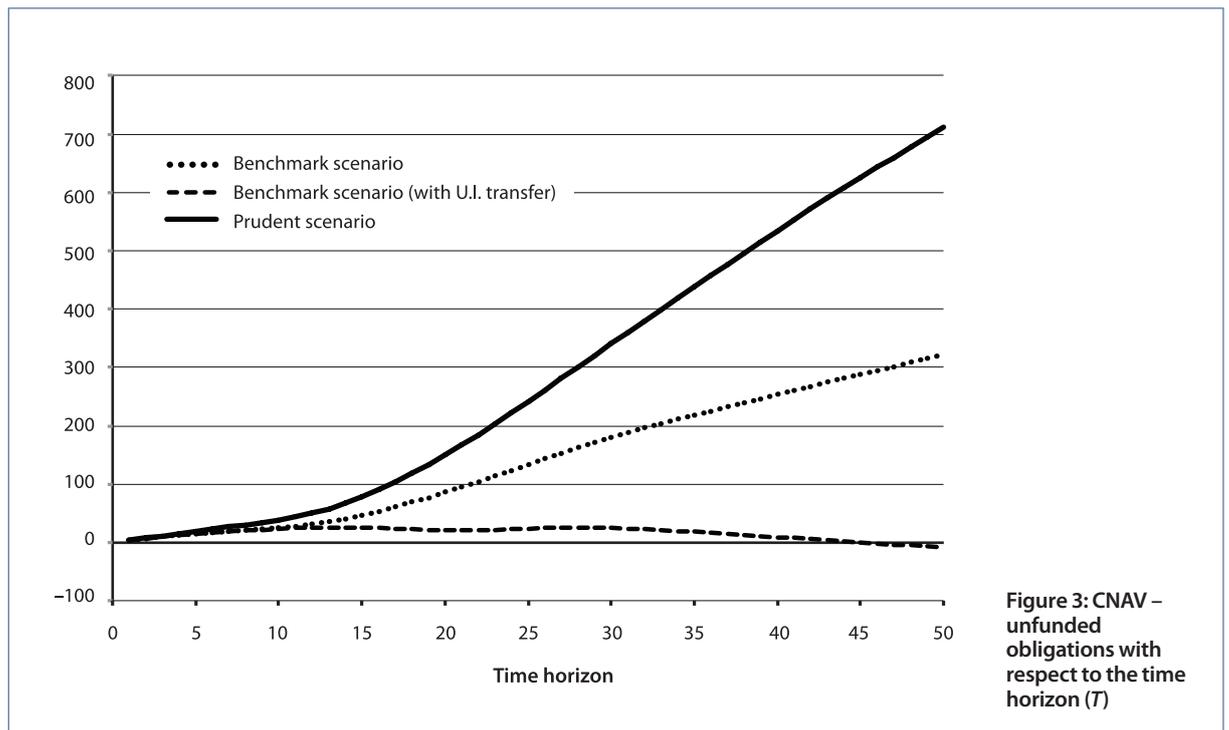


Figure 3: CNAV – unfunded obligations with respect to the time horizon (T)

3.1.3 Tax gap ratio (TGR)

The relative tax gap ratio (TGR_0) measures the excess ratio of the present value of expenditures with respect to the present value of receipts. For a given T time horizon, this ratio is computed as follows:

$$TGR_0 = \frac{\sum_{t=1}^T \frac{EXP_t}{\prod_{i=0}^t R_i}}{\sum_{t=1}^T \frac{REC_t}{\prod_{i=0}^t R_i} + F_0}. \quad (4)$$

3.2 Two examples of ABMs

3.2.1 Main issues about ABM

The purpose of an ABM is to work out the following problem: how to adjust the expenditures and the receipts to guarantee the solvency of the unfunded pension scheme?

We introduce two adjustment time factors – A_t and B_t – applying respectively to payroll tax rate and pension benefits at time t . Devising an ABM consists in designing a time path: $A_t \times EXP_t$ and $B_t \times REC_t$.

As an illustration, consider Sweden, a pioneer country in adopting an ABM. Its solvency concept is carried by a notional asset-liability approach. The pension amount is the unique adjustment variable: hence, A_t is constrained to 1 and only B_t adjusts. In comparison, in France, where official forecasts are based on the optimistic assumption, the transfer from UI can be interpreted as substituting the pension payroll tax by UI payroll tax. If the official assumption proves true, then the sustainability of the CNAV is guaranteed, since the government implicitly adopts a payroll tax adjustment such that $A_t > 1$ and $B_t = 1$.

3.2.2 ABMs based on the TGR

Here, we suggest using the TGR to design a simple ABM (denoted TGR-ABM). When $F_0 = 0$, solvency is guaranteed after a permanent adjustment with the following values of parameters:

$$\tau_t^* = \tau_t \times TGR_0, \text{ for a full adjustment by the payroll tax} \quad (5)$$

or

$$p_t^* = p_t \times TGR_0^{-1}, \text{ for a full adjustment by the pension amount.} \quad (6)$$

These changes, based on the tax gap, can be extended to mixed adjustments, by allowing for a possible trade-off between full adjustment by tax or by pension. To this effect, we introduce a tax gap elasticity parameter α which weights the degree of adjustment by pension. The value $1 - \alpha$ (respectively $-\alpha$) defines the elasticity of the adjustment factor A (respectively B) to the TGR . The following permanent solutions are then anticipated:

$$\begin{cases} A_t = TGR_0^{1-\alpha} \\ B_t = TGR_0^{-\alpha} \end{cases} \quad (7)$$

In France, the reserve funds can be considered as nil (see appendix), so these formulae can be directly used to estimate the values of these TGR-ABM.

Figures 4 and 5 respectively depict the sensitivity of the adjustments to time horizon for different values of α in the benchmark scenario and the prudent scenario. In the two scenarios (benchmark without UI transfers and prudent), the adjustments by receipts A (respectively by pensions, B) describe a decreasing (respectively increasing) relation with respect to time horizon for $T < 10$. The relation becomes increasing (respectively decreasing) for a longer horizon. These results illustrate the fact that past reforms cause receipts to grow (on average) faster than expenditures during the first decade.

The graphs also show the sensitivity of the adjustment variables with respect to α . There are two limit values – $\alpha = 1$ and $\alpha = 0$ – meaning a full adjustment through pensions and contributions respectively. Considering a 50-year horizon, a 5.5% permanent decline in pension is required in the first case ($\alpha = 1$), as against a 5.8% permanent increase in contributions in the second case. With the same time horizon and an intermediate value of $\alpha = 0.5$, financial solvency requires a 2.8% permanent reduction in pensions coupled with a 2.9% permanent increase in contributions.

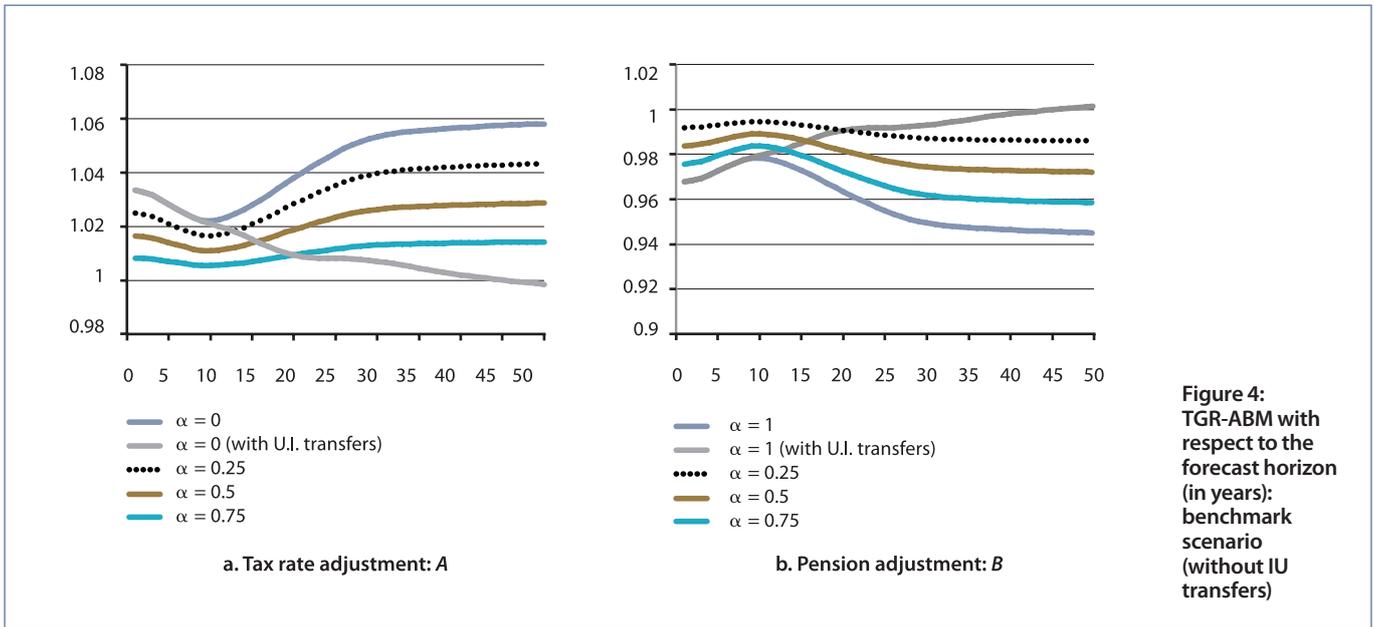


Figure 4: TGR-ABM with respect to the forecast horizon (in years): benchmark scenario (without IU transfers)

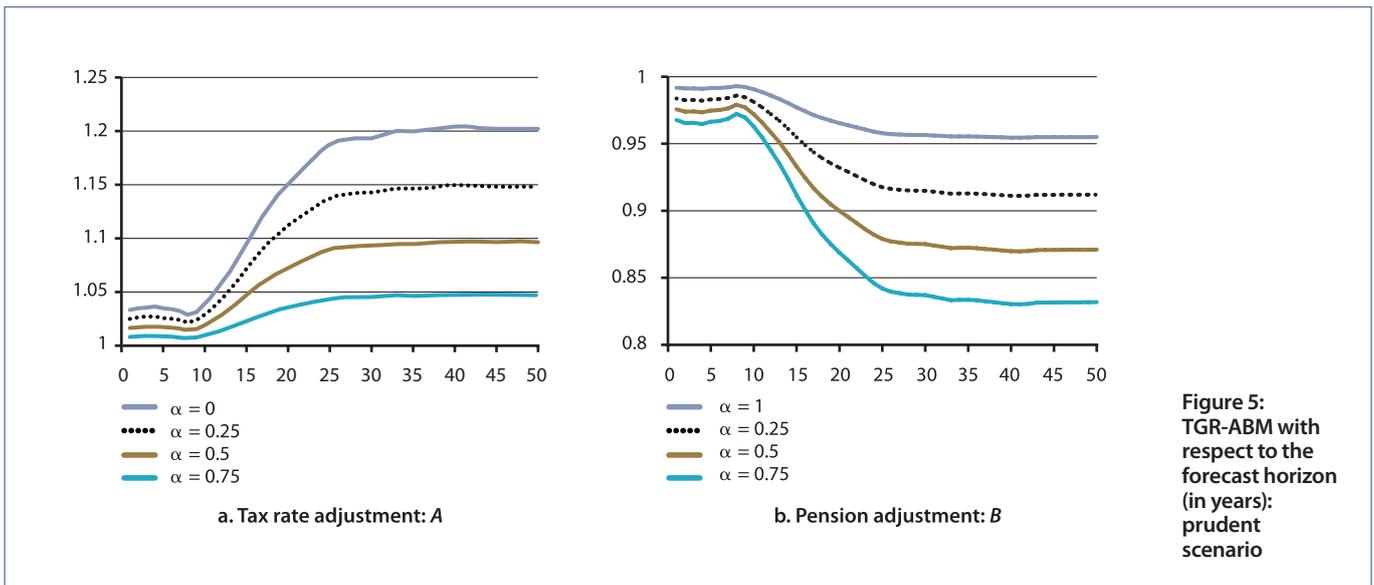


Figure 5: TGR-ABM with respect to the forecast horizon (in years): prudent scenario

3.2.3 S-ABM: smooth automatic balance mechanism

Using an ABM derived from a tax gap ratio can be politically and socially difficult to apply, because it induces an immediate and permanent adjustment. To bypass this obstacle, a solution may require devising a smooth, gradual adjustment in contribution rates and pension levels. To this effect, Gannon et al. (2013) build a model based on dynamic programming called “smooth automatic balance mechanism” (S-ABM). The “socio-political” sensitivity to changes in legislation is apprehended by a quadratic loss function. The distortion cost of the receipts (resp. of the expenditures) is given a weighting² α (respectively $1 - \alpha$). At period t the loss function (LF_t) can be written as follows:

$$LF_t = \alpha \cdot (A_t - 1)^2 + (1 - \alpha) \cdot (B_t - 1)^2. \tag{8}$$

2 For the sake of simplicity, we use the same notation as that used for the TGR adjustments because in the presentation of simulation results, the parameter values are the same for the two ABMs: TGR and S-ABM.

For a forecast horizon T , the S-ABM aims to match the sum of discounted receipts with the sum of discounted expenditures:

$$\sum_{t=1}^T \frac{A_t \cdot REC_t}{\prod_{i=1}^t R_i} + F_0 = \sum_{t=1}^T \frac{B_t \cdot EXP_t}{\prod_{i=1}^t R_i}. \tag{9}$$

The authors assume that the social planner has a time preference. By denoting δ the public preference for present rate, the dynamic program to optimise is:

$$\left\{ \begin{array}{l} \min_{\{A_t, B_t\}} \sum_{t=1}^T \left(\frac{1}{1+\delta} \right)^{t-1} \cdot LF_t. \\ s.t. \quad (9) \end{array} \right. \tag{10}$$

The first order conditions lead to the initial optimal values A_1 and B_1 , which are functions of the unfunded obligations:

$$\left\{ \begin{array}{l} A_1 = 1 + UO_0 / \left(\sum_{t=1}^T \frac{R_1}{\left(\frac{1}{1+\delta} \right)^{t-1} \cdot (\prod_{i=1}^t R_i)^2} \cdot \left(\frac{REC_t^2 + \frac{\alpha}{1-\alpha} \cdot EXP_t^2}{REC_1} \right) \right) \\ B_1 = 1 - UO_0 / \left(\sum_{t=1}^T \frac{R_1}{\left(\frac{1}{1+\delta} \right)^{t-1} \cdot (\prod_{i=1}^t R_i)^2} \cdot \left(\frac{\frac{1-\alpha}{\alpha} \cdot REC_t^2 + EXP_t^2}{EXP_1} \right) \right) \end{array} \right. \tag{11}$$

The dynamics of the adjustment factors can be inferred for $t \geq 2$:

$$\left\{ \begin{array}{l} A_t = 1 + \frac{REC_t}{REC_1} \cdot \frac{1}{\left(\frac{1}{1+\delta} \right)^{t-1} \cdot \prod_{i=2}^t R_i} \cdot (A_1 - 1) \\ B_t = 1 + \frac{EXP_t}{EXP_1} \cdot \frac{1}{\left(\frac{1}{1+\delta} \right)^{t-1} \cdot \prod_{i=2}^t R_i} \cdot (B_1 - 1) \end{array} \right. \tag{12}$$

We consider two successive scenarios: the benchmark scenario without UI transfer (Figure 6) and the prudent scenario (Figure 7). Figures 6a and 7a provide the simulations for the reference values of parameters: $\alpha = 0.5, T = 50$ and $\delta = 2.5\%$. Assuming the benchmark (respectively prudent) scenario, Figure 6a (respectively Figure 7a) shows that immediate adjustments imply both a 1.5% (respectively 3.6%) reduction in pensions and a 1.4% (respectively 3.5%) increase of tax rate. In the long run, these adjustments reach 4.8% (respectively 9.1%) and 4.5% (respectively 9.1%). In comparison, a TGR-ABM would induce a flat adjustment with a 2.8% (6.3%) pension reduction and 2.9% (6.7%) tax rate increase. This is dramatically illustrated by the dynamics of the reserve fund. For the benchmark scenario, it increases from zero (right vertical axis) to reach in 2026 a maximum of about 18 B€. Over this period, the pension scheme yields a surplus. Then it decreases – deficit period – to reach in 2048 a minimum of –60 B€. It finally grows again – second period of surplus – and cancels out in 2063. A similar dynamic over a larger range prevails in the “prudent” scenario: in 2030 it reaches a maximum of about 93 B€ and a minimum of about –27 B€ in 2057. This difference is due to the fact that, in order to comply with a less optimistic forecast, larger amounts of money must be saved.

We evaluate three parametric variants:

- lower public preference for the present rate, inducing less procrastination (Figure 6b and Figure 7b) with $\delta = 0\%$
- lower distortion cost through receipts with $\alpha = 0.25$ (Figures 6c and 7c)
- shorter forecast horizon with $T = 25$ (Figures 6d and 7d).

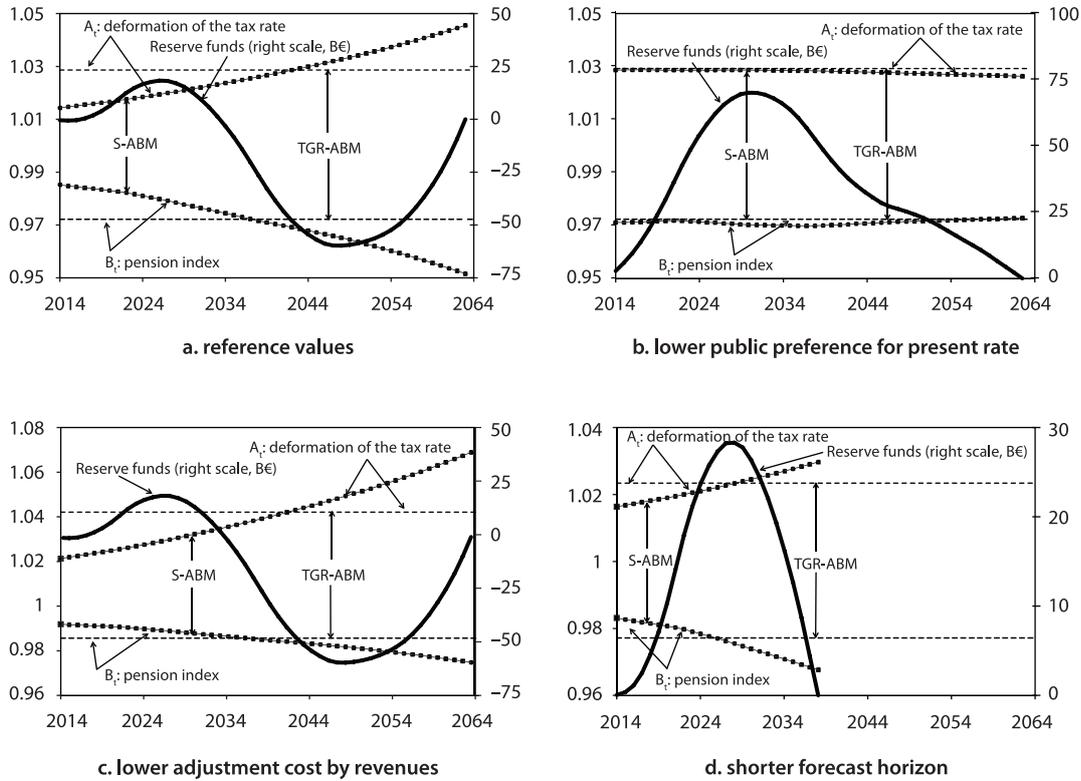


Figure 6: Benchmark scenario (without UI transfer)

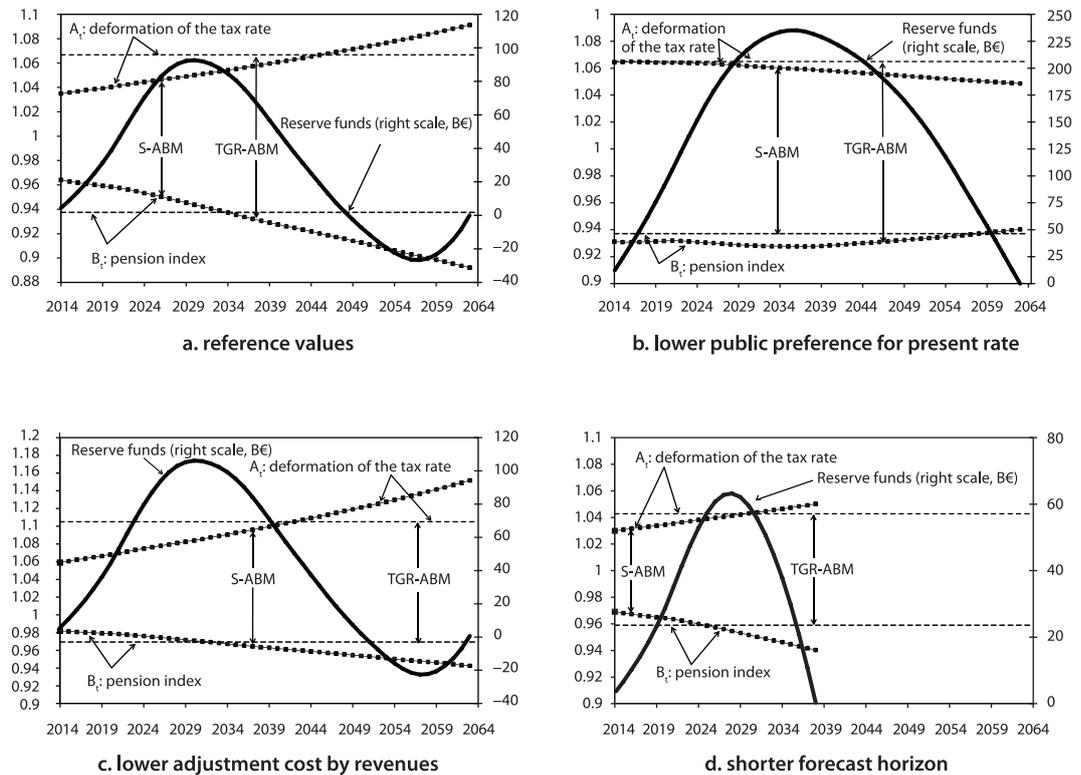


Figure 7: Prudent scenario

A lower public preference for the present rate ($\delta = 0\%$) increases the cost of procrastination. It results in stronger adjustments in the short run and weaker adjustments in the long run. Figures 6b and 7b show a flatter profile of the A_t and B_t . In Figure 6b, the path of adjustments is very similar to those obtained under TGR-ABM. Flat profiles are obtained when growth rates of expenditures and receipts are very close to the interest rate, net of the public preference for the present rate (compare with the dynamics of adjustment factors). By contrast, Figure 7b shows a more pronounced decrease in factors. This property results from the fact that the long-run growth rates of expenditures and receipts are lower than the interest rate, net of the public preference for the present rate. Larger immediate adjustments result in more savings being accumulated over a longer period.

Figures 6c and 7c illustrate the fact that a lower distortion cost through receipts ($\alpha = 0.25$) implies a higher adjustment cost through expenditures. Not surprisingly, the adjustment factor of expenditures is reduced, while the adjustment factor of receipts is higher. The profile of the reserve fund is little modified because there is mainly an intratemporal balancing effort from expenditures over receipts.

A shorter forecast horizon ($T = 25$) means lower unfunded obligations. It results in lower levels of adjustment factors (Figures 6d and 7d). It follows that this shrinks the range of the reserve fund.

4 CONCLUSION

In this paper, we have studied how using ABMs could ensure financial stability of the French first pillar pension system for private sector employees (CNAV). Two scenarios are considered, respectively optimistic (benchmark) and pessimistic (or prudent). The use of ABMs can be particularly useful to set the pension scheme on “auto-pilot” (Bosworth & Weaver 2011) so as to avoid systematic and wasteful political debates about adopting reforms to restore solvency.

Unsurprisingly, our results stress that the governance of the CNAV may require significant reductions in pensions and a higher contribution rate.

In the special case of a flat adjustment obtained with TGR-ABM, this requires, for the benchmark (respectively prudent) scenario, a significant 2.8% (respectively 6.3%) reduction in pensions and a 2.9% (respectively 6.7%) rise in the contribution rate.

If the ruling authority (the government) seeks slower and smoother changes, it may set adjustment rules based upon a smooth ABM (S-ABM). For the benchmark (respectively prudent) scenario, such rules imply an immediate 1.5% (respectively 3.6%) reduction in pensions and a 1.4% (respectively 3.5%) increase in the tax rate. In the long run (50 years), such rules imply a 4.8% (respectively 9.1%) reduction in pensions and a 4.5% (respectively 9.1%) increase in the tax rate.

Obviously, the scope of our simulations is limited, since they are based only on two alternative forecasts (pessimistic versus optimistic). A natural extension of our analysis could consist of stochastic simulations, which would capture a larger distribution of possible adjustments.

APPENDIX: AN OVERVIEW OF THE CAISSE NATIONALE D'ASSURANCE VIEILLESSE (CNAV)

The pay-as-you-go public pension regimes represent 14.5% of the French GDP and around 97.8% of retirees' revenues. The average direct pension (that is, excluding widows' and orphans' pensions) is close to 1250 euros per month, 1600 for males and 900 for females.

In this paper, we focus on private sector (around 70% of the workers) pensions and on the basic pension scheme, CNAV, which provides an average pension of 641 euros per month (in 2012).

The *Caisse Nationale d'Assurance Vieillesse* (CNAV) was set up in 1945. In 1999, there was an attempt to create a reserve fund in addition to the pay-as-you-go component. It was a failure, because the accumulated funds are not very high and hardly compensate for past deficits. So, CNAV can be considered as a fully pay-as-you-go scheme.

CNAV individual pensions are computed as follows (Gannon & Touzé 2013):

$$P_{cnav} = w \times \lambda \times \min\left(1, \frac{T}{T'}\right) \quad (\text{A1})$$

and:

$$\lambda = 0.50 \times [1 - 0.05 \times \max(\min(T' - T; FRA - ERA); 0)] \quad (A2)$$

where:

- P_{cnav} is the yearly amount of CNAV pension (paid monthly);
- w is the so-called “reference wage”, it is a yearly wage computed as the 25 best wages (under the “social security ceiling”) brought up to date according to the price index;³
- λ is called the pension ratio, less than a maximum of 50%;⁴
- T is the number of years contributed by a given individual;
- T' is the minimum number of years contributed which is required to draw a full rate pension (Table A1);
- FRA is the full retirement age (Table A1), that is, the age when people must retire if they want to draw a full-rate pension ($\lambda = 0.5$) in case they have not reached the minimum contributive period;
- ERA is the individual’s effective retirement age.

The combination between T and T' applies twice: first, to compute the pension ratio λ (A2), if the individual has not contributed during the period set by the scheme’s rules, the pension ratio is lowered whenever the individual has not waited until he has reached the age “ FRA ”. Second, to compute the pension per se (A1) because the pension is paid pro rata temporis. Note that individuals cannot retire before a minimum age (Table A1) even if they have reached T' , unless they are very early workers (that is, those who have worked before 20 and have completed T' years of employment, and therefore contributions).

Four cases can be described:

- if the individual retires after the minimum age (see Table A1) while having reached the minimum contributive period (see also Table A1), then $\lambda = 50\%$ and $T/T' = 100\%$, meaning that P_{cnav} is 50% of the reference wage;
- if the individual retires at the automatic full rate age (FRA) and has reached the minimum contributive period, then $\lambda = 50\%$ and $T/T' = 100\%$, meaning that P_{cnav} is 50% of the reference wage;
- if the individual retires at the automatic full rate age (FRA) and has not reached the minimum contributive period, then $\lambda = 50\%$ and $T/T' < 100\%$, meaning that P_{cnav} is paid pro rata temporis and less than 50% of the reference wage;
- if the individual retires when he or she has not reached these periods/ages, then, a 5% yearly discount is applied to λ and the pro rata temporis is applied to the downgraded value of λ so that the pension is well below 50% of the average wage.

In 2003, a premium was introduced in order to provide some incentives for people to work later. This premium amounts to 3% of the pension the first year, 4% over the following three years and 5% in the fifth year if the individual is aged more than 65.

The last 2012 forecasts (Conseil d’orientation des retraites, 2012) have evidenced the emergency of core adjustments to guarantee sustainability of the French pension system.

Under this constraint, the Ayrault government has taken measures in 2013. A 0.6 point increase in the contribution rate, paid equally by workers and employers, is scheduled between 2014 and 2017, in order to restore the CNAV financial balance. Hence, for each of them, the contribution rate will increase by 0.3 points. If there are no other adjustments, the wage earners’ contribution rate will reach 6.40% of the wage under the ceiling, plus 0.40% of their total wage, and the employers’ contribution will be 8.45% of the bounded wage plus 1.90% of the total wage.

This last 2013 reform also includes a “hardship account”, the purpose of which is to compensate for the tediousness of certain jobs through an early retirement or a training period. Please note that our simulations do not take account of the costs induced by this account.

³ It is bound to the “social security ceiling” so that the pension is, in fact, proportional to the fraction of the wage lower than or equal to the social security ceiling. In 2014, the “social security ceiling” is valued at 37 548 euros per year or 3129 euros per month.

⁴ This means that, if an individual fulfils all the conditions laid down by the scheme’s rules, then his maximum pension provided by CNAV is 50% of the social security ceiling.

Table A1: Minimum ages and contributive periods for PAYGO basic pension scheme after the 2013 reform

Birth year	T': minimum contributive period (years)	Application year	Minimum age	FRA (full retirement age)
before 1944	37.5	Before 2004	60	65
1944	38.0	2004	60	65
1945	38.5	2005	60	65
1946	39.0	2006	60	65
1947	39.5	2007	60	65
1948	40.0	2008	60	65
1949	40 + 1 q.*	2009	60	65
1950	40 + 2 q.	2010	60	65
1951	40 + 3 q.	2011	60	65
1951	40 + 3 q.	2011	60 + 4 m.†	65 + 4 m.
1952	41.0	2012	60 + 9 m.	65 + 9 m.
1953	41 + 1 q.	2014	61 + 2 m.	66 + 2 m.
1954	41 + 1 q.	2015	61 + 7 m.	66 + 7 m.
1955	41 + 1 q.	2017	62	67
1956	41 + 1 q.	2018	62	67
1957	41 + 1 q.	2019	62	67
1958	41 + 3 q.	2020	62	67
1961	42.0	2023	62	67
1964	42 + 1 q.	2026	62	67
1967	42.5	2029	62	67
1970	42 + 3 q.	2032	62	67
1973	43.0	2035	62	67

* q.=quarter

† m.=month

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Acknowledgments

We would like to thank the anonymous referee and Anthony Asher for their valuable comments and corrections which significantly improved the quality of the paper. Of course, all remaining errors would be ours. We also thank the AJAP team for its precious editorial assistance.

What can we learn from population ratios

DR DOUG ANDREWS



Dr Doug Andrews

ABSTRACT

Actuaries and others often use ratios to determine historical changes and to make predictions about future conditions. This paper considers the usefulness of using population ratios to predict the future financial impact on social support systems. I define two common population ratios and show the direction of the predicted financial impact on social support costs of population aging using these ratios. I present the analysis of two researchers, Spijker and MacInnes, and note how their analysis contradicts the predictions indicated by the common population ratios. I consider differences between social support systems with respect to health and long term care and those providing retirement income. I consider two ways in which Sweden is taking steps to make the burden indicated by population ratios more bearable, with respect to retirement income. Unfortunately Sweden's calculation of the assets is flawed and so the adjustments required by the ABM are unfairly advantageous to pensioners and unfairly disadvantageous to future contributors. However, a concept developed for the estimation of assets, turnover duration, is useful. I propose two new population ratios, refined to incorporate components of turnover duration, and illustrate this approach using information concerning the Swedish pension system. I propose four recommendations.

KEYWORDS

age of full entitlement, automatic balance mechanism, notional defined contribution, old age support ratio, PAYGO, populations ratios, real elderly dependency ratio, turnover duration

1 TWO COMMON POPULATION RATIOS

The old age dependency ratio (OADR) is usually defined as the ratio of the population aged 65 and over to the remaining adult population, typically those aged 16 to 64. Although one might choose a different definition of the adult population less than age 65, such as those aged 20 to 64. The OADR is normally a fraction less than one. If this number is increasing, it indicates that the size of the age-65 and older population is increasing relative to the remaining adult population. Occasionally research will be presented using the old age support ratio (OASR). The OECD calculates this ratio as the population aged 20 to 64 divided by the population aged 65 and over. This ratio approximates the inverse of the OADR; hence, a declining OASR conveys the same message as an increasing OADR. The OASR is normally greater than one.

One approach to make predictions about the financial burden of social support systems in the future is to examine how these population ratios are expected to change over time. Information is available regarding the projected sizes of the various population groups. This information is considered relatively reliable because population data is considered easier to predict and less volatile than, say, economic data. Simplistically, once a person is born, he or she gets one year older each year. This view is overly simplistic, especially for long-range projections, for a number of reasons.

For those already born, in many instances, they do get one year older each year. But not everyone will. There will be some deaths each year and it is necessary to make assumptions regarding the ages at which such deaths occur. Based on probabilities, a vastly greater proportion of the deaths will occur at ages 65 and older, which is comforting for those calculating OADR and OASR. However, it is still important to estimate the age at death. Various studies have shown that the rates of mortality above age 65 are decreasing in developed countries. Moreover, there are genuine differences in opinion about what the rate of mortality improvement at higher ages will be in the future. This assumption affects the population ratios.

But this is the stronger basis for the population ratios. Two other factors, which are more difficult to predict, are the birth rate and the immigration rate. At a rate of approximately 2.1 births per adult female (referred to as the replacement rate), a population is considered to be in a steady state (in terms of numbers). In developed countries over the last five decades we have observed a trend toward declining birth rates. Most developed countries' birth rate has fallen below the replacement rate, as shown in Table 1.

A falling birth rate influences the distribution of the population. When the birth rate is below the

Table 1: Total fertility rates: number of children born to women aged 15 to 49, 1970–201

Country	1970	1980 - 1985	1990 - 1995	2000 - 2005	2010 - 2015
Australia	2.9	1.91	1.86	1.75	1.88
Canada	2.2	1.63	1.69	1.52	1.66
France	2.5	1.87	1.72	1.88	1.98
Germany	2.1	1.46	1.30	1.35	1.42
Italy	2.4	1.54	1.28	1.25	1.48
Japan	2.1	1.75	1.48	1.30	1.41
South Korea	4.5	2.23	1.70	1.22	1.32
Mexico	6.7	4.25	3.16	2.54	2.20
Spain	2.9	1.88	1.28	1.29	1.50
Sweden	1.9	1.64	2.01	1.67	1.92
UK	2.4	1.78	1.78	1.66	1.89
USA	2.5	1.80	2.03	2.04	1.97

Source: OECD (2013) p.179 for 1980 – 2015 and Population Reference Bureau (2014) for 1970.

replacement rate we observe an ageing population, that is, the population distribution is becoming more heavily weighted toward older ages. This affects the population ratios.

However, from the viewpoint of making forecasts, predicting future birth rates is difficult. One can observe considerable volatility in the birth rates and different patterns by country. Although we can observe that women in developed countries are having their first child at a later age in life, it is hard to know whether this will result in fewer children per adult woman or whether the timing of child births has changed, but total numbers are remaining the same (or are increasing). With respect to immigration, it is largely affected by government policy and socio-economic conditions by country. These change over time and are difficult to predict. It takes long periods of time to answer this question.

In conclusion, there is no question that the population ratios are crude measures and blunt instruments in trying to predict the future financial impact of social support systems. Nevertheless, these ratios are commonly used. What do they show? Table 2 shows the change in OASR, by dividing the OASR in 2008 by the projected OASR in 2050.

From the table we can see that the ratios of the OASR in 2008 to the projected OASR in 2050 are enormous for South Korea and Mexico, 4.2 and over 3.5 respectively and very significant for Spain and Japan,

Table 2: The old age support ratio (OASR) and projected OASR

Country	OASR 2008	OASR 2050	Change (2008 over 2050)
Australia	4.5	2.3	1.96
Canada	4.6	2.1	2.19
France	3.5	1.9	1.84
Germany	3.0	1.6	1.88
Italy	3.0	1.5	2.00
Japan	2.8	1.2	2.33
South Korea	6.3	1.5	4.20
Mexico	8.9	2.5	3.56
Spain	3.7	1.5	2.47
Sweden	3.3	2.2	1.50
UK	3.7	2.4	1.54
USA	4.7	2.6	1.81

Source: Author's calculations and OECD (2014).

approximately 2.5 and 2.3, respectively. The countries with the least significant ratio are Sweden and the UK, each about 1.5.

In forecasting the financial burden of our social support systems for the elderly, such ratio analysis is often used. It indicates a significantly increasing burden.

2 THE REAL ELDERLY DEPENDENCY RATIO

Spijker and MacInnes (2013a, 2013b) define the real elder dependency ratio (REDR) as the total number of people with a remaining life expectancy of 15 years or less divided by the number of people actually working, regardless of their age. They argue that this measure is a better one to use than OADR when considering the financial impact of an ageing population. They criticise the OADR on several grounds.

First, they argue that OADR is not a measure of dependency (the D in OADR). Because OADR treats those age 65 and older as dependent, it is criticised as being both too broad a measure and too narrow a measure. It is too broad because there are those age 65 and older who continue to work full time, who are not dependent by any definition, other than chronological age. It is too narrow a measure, not only because there are older people who are not yet age 65 who have left the labour force and might be considered dependent, but

also because there are a number of adults well below age 65 who are dependent.

Second, if OADR is intended to provide an indication of the financial burden of the elderly, then Spijker and MacInnes (2013a, 2013b) argue that a better proxy for the burden is the size of the population expected to be within the last 15 years of life, that is, within 15 years of expected death. They argue that due to the combination of medical and socio-economic factors, such as better nutrition, medical advances and more years of education, the greatest portion of medical expenses is associated with the later years of life. Hence examining the relative size of the population expected to be within the last 15 years of life is a better proxy for financial impact.

This is the gist of their argument, but the punch line comes when they present the behaviour of the OADR and REDR over various time periods for a variety of developed countries (Spijker & MacInnes 2013b, Figure 4). OADR has been increasing, reflecting an ageing population, and raising concerns regarding significant costs associated with an ageing population. With one exception – Japan – REDR has been level or decreasing. Hence, Spijker and MacInnes conclude there should not be concern about the cost burden of an ageing population.

In January 2014, the Society of Actuaries (SOA) held its fifth symposium, entitled Living To 100. (The papers discussed at this symposium will be published later in 2014. Observations drawn from the symposium are based on my notes and recollection.) A central point of debate is whether there is some natural limit to human life, perhaps around 120 years, or whether through medical and technological developments we can virtually eliminate disease or find means to repair, replace or reinforce the body so that life can be extended significantly (or possibly forever). This is not a question I will attempt to answer. Nonetheless, there seems to be mounting evidence that for many people in developed countries we have been able to postpone the onslaught of fatal disease. Not only are people living longer than in previous decades, on average, but also the health status of people at older ages is better than it was for people of a comparable age in previous decades, on average.

In other words, there has been a general reduction in mortality rates and there has been a compression of morbidity. Moreover, there is some evidence to suggest that the medical and care cost incurred in the last couple of years preceding death decreases as age at death increases. All this evidence provides support for Spijker's and MacInnes' argument (2013b) that the OADR is sending the wrong signal with respect to health and care costs. For such costs REDR may well be a better indicator.

3 LONGER HEALTHY LIVES AFFECT DIFFERENT SOCIAL SUPPORT SYSTEMS DIFFERENTLY

However, this argument does not hold with respect to PAYGO pension costs. Many countries still have age 65 as the AFE for pensions. Although increases in the AFE have been announced in about one-half of the OECD countries, countries have been very slow to increase the AFE. Consequently as average age at death has increased, the period for which pension payments have been paid and are expected to be paid has increased. Moreover, as the ratio of those age 65 and older has increased relative to the remaining working age population, the burden of paying PAYGO pensions must be borne by a proportionately smaller base. It is true that OADR is a very crude measure. But with respect to PAYGO pension costs, OADR sends the right signal about the increasing burden and our ability to bear this burden. REDR is not an appropriate measure for these costs because it excludes the period of income receipt from pension commencement to the time that people are expected to be within 15 years of death.

Hence, while the news is good that we can expect to live longer and remain healthier for longer periods of time, in the absence of any dramatic changes to the AFE we can expect the total expenditures (costs) associated with PAYGO pensions to continue to increase. But this is just one aspect of whether the costs are more or less affordable. The other aspect is the size of the tax base supporting these costs.

The critical factors affecting this size depend on mortality, birth rates and immigration. As noted, mortality rates have decreased significantly. There is little room for further decreases in the mortality rates for the pre-retirement age population. As shown in Table 1, for many developed countries, birth rates have fallen below the replacement rate. It is not uncommon in making forecasts to assume that birth rates will remain below the replacement rate. Accordingly the relative size of the ratio of pre-retirement adults to retired adults is shrinking, that is, there is an ageing population. This makes the PAYGO pension burden less affordable than previously. Immigration is difficult to forecast. Perhaps countries will increase immigration at pre-retirement working ages to help make the pension burden more affordable. There is no way of telling. Although in a number of developed countries there are political parties that oppose immigration.

In summary, OADR may not be sending the right message with respect to the future burden of health and care costs. REDR may be a better indicator of this burden. With the exception of Japan, REDR provides good news. However, with respect to PAYGO pension costs OADR is sending the right indication. REDR is

not a suitable measure to use. It can be expected that the financial burden associated with PAYGO pension costs will become more difficult to bear.

4 TOWARD BALANCING THE PENSION BURDEN

Various approaches have been suggested to make PAYGO pension costs more affordable in the face of an ageing population. The suggestions often involve either reducing benefits (expenditures) or increasing contributions (revenues). One solution that combines reducing expenditures with increasing revenues is to raise the AFE. As the AFE is raised, the expected period of pension payment is shortened, which reduces the overall pension cost. Also, the size of the pre-retirement adult group increases, spreading the burden of pension costs more broadly, that is, requiring less revenue per capita. One might set the AFE and adjust it periodically to try to maintain an equivalent period of benefit receipt to the period of contributions, across generations. The AFE might be selected to maintain a constant rate of the ratio of life expectancy above AFE to period of work (and contribution) prior to the AFE.

About one-half of the OECD countries have approved an AFE higher than age 65 (OECD 2013). However, few countries have adopted an approach where AFE would increase based on a ratio, as suggested above. There are various reasons for this. Some are administrative: it is easier to work with a set age, people can plan for retirement better when there is a set age: adjusting the age annually requires effort and systems changes. The approach might also be opposed on the grounds of fairness. On average, those of higher socio-economic status live longer. Raising the AFE would have a much greater impact on the total expected pension for someone in a lower socio-economic group than it would for someone in a higher socio-economic group. Accordingly the proposal is regressive.

In the remainder of this paper I examine some aspects of how Sweden's national pension system addresses the financial burden. Sweden has adopted a notional defined contribution (NDC) plan as the main component of its national pension system (referred to as the *inkomstpension*). The contribution rate is fixed: 16 per cent of eligible earnings. Accounts are maintained for each contributor, showing the notional balance. But the system operates on a PAYGO basis, so the funds contributed are used to pay benefits as required. Two characteristics of the system that are used to maintain financial balance are regular adjustments to AFE and the adoption of an ABM. Table 3 shows how AFE needs to be adjusted by cohort in order to maintain the same replacement rate.

Table 3: Increases in retirement age necessary to maintain constant pension

Cohort born in	Life expectancy at age 65	Retirement age to ensure the same replacement rate
1930	82 years 5 months	65
1945	84 years 4 months	65 years 9 months
1960	85 years 7 months	67 years 6 months
1975	86 years 6 months	68 years 3 months
1990	87 years 2 months	68 years 8 months

Source: Baroni & Axelsson (2012) p. 14.

In an NDC system the amount of pension is determined by the size of the accumulated notional account at retirement and the annuity divisor applied. To maintain fairness among those in different years of pension commencement, the annuity divisor is regularly increased to reflect increases in life expectancy at AFE.

Another important component in ensuring that the pensions determined and being paid are affordable is the calculation of financial balance. If the plan is not in financial balance an adjustment is made through the ABM by reducing the credit to accounts and by reducing the scheduled increases to pensions, as required. To calculate financial balance, a balance sheet showing the estimated value of assets and liabilities is prepared. If liabilities exceed assets then the ABM is applied to reduce the liabilities so that the balance sheet balances.

The liabilities are calculated as the current value of the notional accounts plus an estimate of the present value of pensions in payment. The assets are calculated as actual assets plus the value of the expected contributions. It is this latter calculation that is flawed.

5 TURNOVER DURATION IS MISAPPLIED BUT IT CAN PROVIDE INSIGHT

The value of expected contributions is estimated as the annual contributions multiplied by the turnover duration (TD). TD is the sum of pay-in duration and pay-out duration. It is calculated as the difference in years between the weighted-average age at which pensions would be expected to be paid minus the AFE (referred to as pay-out duration) and the AFE minus the weighted-average age at which contributions would be expected to be contributed (referred to as pay-in duration).

This is a steady-state model based on the assumption that contributions were made in a lump sum and pensions were paid in a lump sum. The

problem is that in an NDC model each contribution creates a future pension liability. Therefore the annual contribution should be multiplied only by the duration calculated as the difference between the expected AFE and the weighted-average age at which contributions would be expected to be contributed, that is, for the pay-in duration. During the period between the weighted-average age at which pensions can be expected to be paid and the expected AFE, that is, the pay-out duration, any contributions would create a comparable liability. This liability has not been reflected in the balance sheet.

The consequence is that assets are over-estimated. Accordingly the system does not balance accounts and pensions in payment soon enough. This is unfairly advantageous to pensioners and unfairly disadvantageous to future contributors.

For a very simple illustration of the problem, suppose that the system had only one contributor who contributed for 40 years and whose life expectancy as a pensioner was 20 years. To calculate the liabilities, we would take the weighted average of the pension payments and assume that they were paid out in a lump sum one-half way through the 20-year period of retirement, that is, at time AFE plus 10 years. For the assets, we would take the weighted average of the contributions and assume that they were paid in as a lump sum one-half way through the 40 year period of contribution. Assuming contributions and pension payments are each made in the middle of the year, the arithmetic is as follows.

$$\text{Contributions: } \sum C_t (t-.5) = (40C) 20$$

where $t = 1, 2, \dots, 40$ and all the $C_t = C$ [1]

$$\text{Pension payments: } \sum P_t (t-.5) = (20P) 10$$

where $t = 1, 2, \dots, 20$ and all the $P_t = P$ [2]

Equation [1] shows that 40 times the annual contributions are in the system for 20 years (on average), that is, the pay-in duration. This represents the assets. Equation [2] shows that 20 times the annual pension payments are in the system for 10 years (on average), that is, the pay-out duration. This represents the liabilities.

However, on the Swedish balance sheet the assets are calculated as though 40 times the annual contributions are in the system for 30 years, that is, the pay-in duration plus the pay-out duration. In order to have such assets, some other contributor, who does not exist in our extremely simple example, would have to make contributions during the 10-year pay-out duration.

Of course, if we were to expand the system beyond one individual, it is quite possible that there would be another contributor who could contribute during the

10-year pay-out duration. In a pure PAYGO system that would likely be the case. However, the Swedish system is not pure PAYGO, it is trying to establish a balance sheet. The contributions made by the other contributor during the 10 year pay-out duration for the first contributor would create a new liability, that is, a liability in respect of the second contributor.

Another way to understand the error is to ask what should happen to the balance sheet if the retirement age was unchanged but life expectancy increased? In such a situation we would not expect any increase in assets but we would expect an increase in liabilities. Therefore financial balance should deteriorate. In fact, the way in which the balance sheet is calculated in Sweden, liabilities do increase because pensions are expected to be paid longer; however, assets also increase because pay-out duration increases and therefore the TD increases. This is not the right result (see Andrews (2012) for a fuller explanation and a proposed solution to this error).

Using the simple example above, suppose that life expectancy at retirement age increases by four years from 20 to 24 years, then equation [2] would be replaced by equation [3] below.

$$\text{Pension payments: } \sum P_t (t-.5) = (20P) 12$$

where $t = 1, 2, \dots, 24$ and all the $P_t = P$ [3]

In equation [3] pay-out duration has increased from 10 to 12, which results in an increase in liabilities. Turnover duration has also increased by two years. But it would not make sense to conclude that therefore the assets have increased.

This example illustrates the dangers of using simple models.

As discussed in section 3, the population ratios do not indicate the right message with respect to the financial impact of the ageing population on health and care costs. As noted, REDR provides a better indicator. As will be shown below, although the population ratios indicate the right message with respect to the direction of the financial impact of population ageing for pension costs, they do not indicate the right magnitude. In both these cases we are interested in the right message, we are not trying to make a precise quantification.

However, the situation with respect to the financial balance in the Swedish pension system is different. Here we are trying to calculate a relatively precise financial position, because we are using this financial measure to modify the pensions and account balances within the system. In a PAYGO system, the balancing of the interest of different generations is important.

PAYGO pensions work best with growing populations or steady state populations, because the generations of contributors are sufficiently large

compared with the generations of pensioners that the cost is manageable and distributed (relatively) fairly across generations. However, in ageing populations a PAYGO system gives an advantage to the pensioners to the detriment of contributors and future contributors. To the credit of the Sweden, the NDC system replaced a defined benefit system to have a fairer pension promise across generations. The Swedish system operates in the context of an ageing population. It is also promoted as being a fair system (Settergren, 2003); accordingly, it is very important to identify the error that results in unfairness and to correct it.

In a steady-state situation where there was an indefinite ability to count on a subsequent generation of contributors to contribute to ensure the pensions of current pensioners, the method of calculating financial balance works. But in an ageing population, where fertility rates are below the replacement rate, life expectancy is increasing for those above AFE, and the patterns of workforce attachment may change (for example, by extending the period in education), it is essential that the method of calculating financial balance be fair. It would be very easy computationally to change the method of calculating financial balance to make it fair, as Andrews (2012) observes. Politically, it could be extremely difficult to implement the change, as initially it would have a significant financial consequence. It might also have political implications, as Sweden considers the current system to be a multi-party compromise. Andrews estimated that the assets in 2006 might be overstated by over 40 per cent (Andrews 2008).

However, the TD is a useful concept. It gives another rough measure of how we might better see the financial impact of pensions. A limitation of the OADR and OASR for estimating financial impact is that they are calculated using the number of people in defined age groups in the calculation. If we were to weight the numbers in the adults up to age 65 group and in the age 65 and over group by pay-in and pay-out duration respectively, we would get a better understanding of how long pensions may be expected to be paid and how many years of contributions (or taxes) may be attributed to paying these pensions. We might define Turnover Adjusted Old Age Dependency Ratio (TAOADR) as follows:

$$\frac{(\text{Population of AFE and Older} * \text{Pay-out Duration})}{(\text{Adult Population less than AFE} * \text{Pay-in Duration});}$$

and define Turnover Adjusted Old Age Support Ratio as follows:

$$\frac{(\text{Adult Population less than AFE} * \text{Pay-in Duration})}{(\text{Population of AFE and Older} * \text{Pay-out Duration}).}$$

Table 4: OASR and TAOASR Sweden 2000, 2005 and 2010

Year	Aged 20–64	Age 65 or older	OASR	Pay-in duration	Pay-out duration	TAOASR	Change in OASR 2000/year	Change in TAOASR 2000/year
2000	5,196,228	1,523,922	3.41	21.99799	10.32660	7.26	1	1
2005	5,342,340	1,554,977	3.44	21.26565	10.66803	6.85	0.99	1.06
2010	5,433,133	1,702,406	3.19	20.62228	10.88404	6.05	1.06	1.20

Source: author's calculations based on OECD (2014) and Swedish Social Insurance Agency (2002 p.16, 2007 p. 56, 2012 p.76).

The reason to define TAOADR and TAOASR in terms of AFE, at the time of the determination, rather than age 65 is to provide increased accuracy when AFE is other age 65.

To illustrate the difference between OASR and TAOASR, I have prepared table 4, based on information with respect to Sweden. I have used age 65 instead of AFE, even though AFE is gradually being adjusted upward, because the figures in respect of AFE were not available in the material consulted. The pay-in and pay-out durations do reflect AFE. This should only have a minor impact since AFE is still very close to age 65 and it is used in both ratios being compared.

The information in the table is striking. For OASR there was little change between 2000 and 2005, and a 6% change between 2000 and 2010, that is, OASR might be interpreted to indicate that the financial burden of pensions had increased by 6% over the 10 year period. However, for TAOASR, there was a 6% change between 2000 and 2005, and a 20% change between 2000 and 2010, that is, TAOASR might be interpreted to indicate that the financial burden of pensions had increased 20% over the 10-year period. A figure of 20% over a 10-year period is very significant. Moreover, TAOASR conveys a much more rapid increase in the financial burden than OASR suggests.

Recall the results presented in Table 2. For Sweden OASR was projected to change by 50 per cent over 42 years. A 6% change between 2000 and 2010 is not inconsistent with this result, especially when we see the whole change occurred between 2005 and 2010. But if TAOASR changes by 20% from 2000 to 2010 one must be very concerned that the change in TAOASR over 42 years would be much more significant. Sweden has the lowest change in OASR of all countries shown in Table 2. One can only speculate about how great the change in TAOASR might be for other countries. There is reason to be concerned about the financial burden arising from PAYGO pensions due to population ageing, especially because countries are taking only very limited and slowly implemented measures to increase AFE.

6 CONCLUSIONS AND RECOMMENDATIONS

This paper has discussed the use of the OADR and the OASR as indicators of the future financial burden due to social benefit programs as a result of population ageing. In view of information about improving healthy living that is reducing mortality rates and compressing morbidity, it finds that there are reasons to agree with Spijker and MacInnes (2013a, 2013b) that OADR is not a good indicator of the financial burden for healthcare and LTC costs. REDR may be a better tool to use for such costs.

However, it would be mistaken to draw conclusions regarding the financial burden due to PAYGO pension costs by using REDR. Rather than OASR or OADR, this paper suggests the use of TAOASR or TAOADR. These ratios are calculated for the example of Sweden for which pay-in and pay-out durations are available. These ratios indicate the financial burden associated with pensions is likely to be far greater than what is suggested by OASR or OADR.

In examining the example of Sweden, the paper notes that Sweden is one of the few countries to be regularly changing its AFE as life expectancy increases. Changing the AFE in line with changes in life expectancy is one of the best methods to mitigate the financial burden of pensions due to population ageing. Not only because of the financial effect, but also because it automatically balances the burden between pensioners and contributors (one individual at a time).

In the examination of the Swedish ABM it is noted that financial balance is calculated incorrectly, overstating the financial position. This is unfairly advantageous to pensioners and unfairly disadvantageous to future contributors. However, the paper finds the concepts of TD, pay-in duration and pay-out duration, used by the Swedish system to calculate asset values, to be useful. Unfortunately other national pension systems do not publish information regarding pay-in and pay-out durations. Such information would be helpful in understanding the potential financial burden of PAYGO pensions due to population ageing.

As a result of this analysis, there are four important recommendations:

1. The Swedish pension system should correct its method of calculating assets for the determination of financial balance to use pay-in duration rather than TD.
2. OASR and OADR should not be used for the estimation of the financial burden due to population ageing. For healthcare and LTC, REDR might be used, and for pensions TAOASR or TAOADR might be used.
3. To permit the estimation of the financial burden of pensions due to population ageing, national pension authorities (or another body such as the OECD) should calculate and publish pay-in and pay-out duration.
4. To provide a fairer distribution of the burden of pension costs due to population ageing, countries should take action to raise the AFE and to continue to raise the AFE if life expectancy increases and the distribution of the period of pension receipt to pension contribution changes.

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Sustainability of pension systems in Europe – the demographic challenge

CHRIS DAYKIN



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ABSTRACT

Fiscal sustainability of pensions is a serious issue in Europe because of the ageing of the population but there is also concern that reformed pensions may not be adequate. Actuaries have always been seen as major players in employer-sponsored pension schemes and insured pensions but have often not been very visible in commenting on public policy issues concerning the pension system as a whole. This article introduces the work being done by the Actuarial Association of Europe to raise the profile of actuaries with European institutions on the broader policy issues.

KEYWORDS

ageing population, sustainability, adequacy, public interest, actuaries

1 EUROPE – SLOW TO ADDRESS THE CHALLENGE OF AN AGEING POPULATION

Most countries in the European Union (EU) are experiencing serious challenges to their pension systems, arising to a significant extent from the ageing of the population. Populations are ageing because of relatively low birth rates and rapidly increasing expectations of life, particularly at older ages, in some cases exacerbated by net emigration at working ages.

In spite of the huge importance of this issue for national economies, and indeed for the EU as a whole, for many years the EU took no active role in shaping social security policy or even in encouraging Member States to address the emerging challenges. This was because, from a technical perspective, the EU institutions do not have “competence” in relation to social security (pillar 1)¹, which has from the start been regarded as an issue reserved to national governments.

The one area where work was carried out was to develop regulations to facilitate the accumulation of social security entitlements over a working career spent in several different Member States of the EU. This is in effect a multilateral social security agreement, whereby an individual can get entitlement to benefits based on the aggregate period of time spent contributing to different national social security systems. Benefits will then be payable from each, even if the period of service in a particular country would not of its own right have been long enough to secure entitlement to benefit, provided the total period is enough for qualifying. This was seen not as intervention in matters of social security policy, but as a consequence of the EU responsibility for facilitating the free movement of workers throughout the EU.

The EU institutions did, however, have “competence” in respect of occupational pension schemes (pillar 2), notwithstanding that the form of these varies greatly from country to country. A Directive² was agreed in 2003 relating to “Institutions of Retirement Provision”. It dealt with matters such as separation of employer and pension fund, governance of pension funds, accounts and audit, information requirements and powers of regulatory authorities. However, it did not cover pay-as-you-go (*répartition*) pillar 2 schemes (such as exist in France), nor did it cover book reserve pension systems (such as prevailed in Germany at that time).

Other attempts at legislation for pillar 2 pensions covered issues such as portability, the aim being to facilitate free movement of workers between EU Member States, one of the top objectives of the EU treaties. However, the portability proposals did not progress, because some Member States were opposed to the idea of introducing shorter vesting periods, which was an integral part of the proposal to be able to recognise accrued rights for short periods of service and be able to transfer the corresponding pension accumulation from one country to another.

2 DEVELOPING A MORE PROACTIVE APPROACH

A broader strategy began to emerge when the ECOFIN Council (the Council of Finance Ministers of the EU Member States) requested the Economic Policy Committee of the Council to prepare a progress report by November 2003 providing an overview of analyses that had been carried out at EU level on the impact of ageing populations on public finances. This report, published in October 2003,³ was to examine the merits and limitations of the approach used to assess the sustainability of public finances on the basis of the 2002 stability and convergence programmes.

The report became known as the 2003 Ageing Report and was followed by similar reports in 2006, 2009 and 2012,⁴ each becoming more ambitious in terms of the material covered (the main volume of the 2012 report runs to 472 pages). This began a process of increasing involvement of the EU in the issues surrounding fiscal sustainability of pension systems, which for most countries predominantly means first pillar social security, but also covers public sector occupational pension schemes that are directly financed, in whole or in part, by government contributions.

In July 2010 the European Commission (the executive administration of the EU) issued a Green Paper on pension systems,⁵ which started a debate about what strategies and policies the EU should adopt in order to address the challenges of the ageing population. It dealt with such topics as addressing pension adequacy, securing sustainability, achieving a sustainable balance between work and retirement, mobility of workers and insolvency of employers. In

1 Traditionally in the literature pension systems have been described in terms of pillar 1 (social security), pillar 2 (employer-sponsored pension funds) and pillar 3 (individual pension savings).

2 A Directive is a form of European legislation that is binding on Member States and requires each to introduce legislation in their own jurisdiction to implement the provisions of the Directive.

3 Economic Policy Committee (2003). The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme. EPC/ECFIN/435/03 final

4 European Commission (2012). The 2012 ageing report. Economic and budgetary projections for the 27 EU Member States (2010-2060). European Economy 2/2012

5 European Commission (2010). Green Paper towards adequate sustainable and safe European pension systems. SEC (2010) 830.

other words it gave a broad overview of many key pension policy issues and discussed where the EU might begin to take action on this agenda.

The European Parliament began to take an interest in the fiscal sustainability of pension systems and published a substantial report in October 2011.⁶ Meanwhile the European Commission was working on a White Paper, which was published in February 2012,⁷ setting out future policy.

In 2012 the European Commission published not only the 2012 Ageing Report but also the 2012 Adequacy Report. In principle it would have made sense for these to be combined into a single document, since sustainability and adequacy really need to be considered together. However, the *realpolitik* is that the Ageing Report is developed by the DG ECFin⁸ of the Commission and supports the initiatives of the Economic Policy Committee of the Council, essentially driven by Departments of Finance of Member State governments, whereas the issues of adequacy are most on the mind of DG Employment in support of the Social Policy Committee, which has representation from the labour and welfare departments of Member State governments. There has been talk of more coordination between these two initiatives for the 2015 reports, but at the moment it seems unlikely that they will be combined into a single publication.

Member States of the EU have committed to achieving some specific targets over the decade from 2010 under a programme known as Europe 2020, which is the EU's growth strategy for the coming decade. The President of the European Commission, José Manuel Barroso, referred to this in the following words:

In a changing world, we want the EU to become a smart, sustainable and inclusive economy. These three mutually reinforcing priorities should help the EU and the Member States deliver high levels of employment, productivity and social cohesion. Concretely, the Union has set five ambitious objectives – on employment, innovation, education, social inclusion and climate/energy – to be reached by 2020. Each Member State has adopted its own national targets in each of these areas. Concrete actions at EU and national levels underpin the strategy.

In order to pursue this programme, the European Commission has set up a yearly cycle of economic policy coordination called the European Semester.

The Commission undertakes a detailed analysis each year of Member States' programmes of economic and structural reforms, and provides them with recommendations for the next 12 to 18 months. The significance of this for social security and pension policy is that the EU is now actively reviewing on an annual basis the actions and policies of Member States to make their pension systems more fiscally sustainable, and also making specific policy recommendations.

It is beyond the scope of this short article to discuss in more detail the results of this process and the initiatives that are being put in place by Member States, or the reforms that are being urged on Member States by the European Commission as part of the European Semester Process. Suffice it to say that it is now very clear that the EU does have a role in monitoring the sustainability of pension systems and that these initiatives are of the utmost importance to Member States.

3 THE ROLE OF THE EUROPEAN ACTUARIAL PROFESSION

There are more than 20,000 qualified actuaries in the EU, organised for the most part into national actuarial associations (with the exception of the Institute and Faculty of Actuaries, which has members in over 100 countries, including many European countries). In 1978, following almost three years of preparation, the first meeting of the *Groupe Consultatif Actuariel Européen* (European Actuarial Consultative Group) was held in Paris on 11 May. The intention of forming the *Groupe Consultatif* was to give the actuarial associations of the EU a common voice in Brussels, the heart of the EU. At that time there were nine Member States: Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands and the United Kingdom, with Denmark, Ireland and the UK having joined in 1973, and the others all being founding members (effectively from 1952).

It was not the intention that the *Groupe Consultatif* should take over any of the main functions of an actuarial association from the individual member associations. Individual actuaries would remain accountable to their own association and would not themselves be members of the *Groupe*, which was to be in effect an association of associations. Each association would send delegates to the *Groupe* meetings, where the aim would be to achieve consensus on all matters on which the *Groupe* would put out an opinion or public statement. Initially the primary intention was for the *Groupe* to provide a mechanism for actuarial views to

6 ECON (2011). Pension systems in the EU: contingent liabilities and assets in the public and private sector. IP/A/ECON/ST/2010-26

7 European Commission (2012). White Paper. An agenda for adequate, safe and sustainable pensions. SWD(2012) 7 final

8 DG stands for Directorate General and represents the equivalent at EU level of a government department.

be transmitted to the European Commission, the civil service of Europe, and other EU entities.

Over the years the Groupe Consultatif became established and known, at least to certain parts of the European Commission, and to other European-level bodies, such as Insurance Europe, which represents national insurance associations and Pensions Europe, which represents associations of pension funds. It has had a particularly strong voice in the development of insurance regulation at the EU level and in the formulation of EU legislation on insurance business and pension funds. In 1992 the Groupe adopted a common code of conduct, which all member associations were required to incorporate into their own code of conduct, or ensure that their own code covered all the points in the Groupe code.

Also in 1992 the Groupe agreed a common core syllabus for the education of fully qualified actuaries. Whilst this is still evolving, the influence of the Groupe in this respect has led to a significant convergence of the content and level of actuarial education. This initiative was in part driven by the need to respond to the EU Directive on mutual recognition of higher education diplomas, which requires Member States not to discriminate against individuals who have attained their qualifications in other Member States. From a professional perspective this legal requirement was seen as too weak, and the Groupe mutual recognition agreement, accompanied by the common core syllabus for the education of actuaries and the agreed core code of conduct, encouraged actuaries working across borders to join the association in any country where they are practising as an actuary, and to comply with local professional regulation and standards.

The Groupe has for many years had strong relationships with DG Markt (the Directorate General for Internal Market and Services) and has provided advice and input on many matters concerning the regulation of insurance companies and occupational pension funds. More recently a close relationship has been developed with EIOPA (European Insurance and Occupational Pensions Authority). However, the Groupe had not been active at all in addressing the bigger picture issues of national pension policy, social security and population ageing, partly because these were not issues that were seen as being within the competence of the European Commission, but also because relatively few actuaries work directly in the public policy area, being largely employed on private sector pension issues.

4 GREATER PUBLIC POLICY ENGAGEMENT

However, with the increasing importance of fiscal sustainability and the intervention of the European Commission and the European Parliament in the issues of ageing and pension reform, the leadership of the Groupe decided that the time had come to see whether the actuarial profession could develop a voice on these topics, where actuaries clearly had the competence to speak out, even if only a minority of actuaries were directly employed in public policy roles. Having spent many years as the Government Actuary of the UK, I was asked to chair a Social Security Sub-committee of the Pensions Committee of the Groupe, which was set up in July 2012 with terms of reference of which the following are perhaps the most important:

1. monitor announcements and publications relating to the matters listed above, especially from the European Commission, the European Parliament and the Council
2. identify topics on which it might be practical and useful for the Groupe Consultatif to develop a discussion paper or position paper and/or to issue a press release
3. carry out research drawing on readily available materials, such as projections of the population and of social expenditure (fundamental research involving development of models of our own is unlikely to be feasible)
4. present through the Groupe Consultatif the views and advice of the actuarial profession in the EU on matters of concern to the profession in demography, ageing, social security and social protection policy to the EU Institutions, particularly the European Commission and the European Parliament, and, where appropriate, to other organisations
5. organise regular meetings with representatives of DG Employment, Social Affairs and Equal Opportunities to discuss matters of mutual interest
6. seek opportunities to brief Members of the European Parliament (MEPs) on work carried out by the Groupe Consultatif and in particular on any published position papers and press releases.

4.1 Sustainability of pension systems

The activities of the sub-committee were launched with the publication of the report *Sustainability of pension systems in Europe – the demographic challenge*⁹

9 Groupe Consultatif Actuariel Européen (2012). *Sustainability of pension systems in Europe – the demographic challenge*. http://www.gactuaries.org/documents/Sustainability_pension_system_%20final_020712%20270612_web.pdf

in July 2012. As the sub-committee had only just been set up, this was primarily based on a paper that I had developed previously, which was reviewed by members of the sub-committee and the Groupe's main Pensions Committee, to which the sub-committee reported. The report created a great deal of interest, both in the European Commission (especially DG Employment) and among MEPs. The Groupe had recently appointed a full-time deputy chief executive with special responsibility for public affairs, Pia Skaerbak, and, working together with the chairman of the Pensions Committee, Falco Valkenburg, we set up a large number of meetings with MEPs, with different parts of the European Commission and with various European lobby groups, including Insurance Europe, Pensions Europe, AEIP (European Association of Paritaire Institutions), AMICE (Association of Mutual Insurers and Insurance Cooperatives in Europe).

4.2 Adequacy of pension systems

These meetings, and the wider promulgation of the report, had the effect of establishing the credentials of the Groupe as an authoritative commentator on these issues. Since then we have tried to build on this initial impetus and have started to develop a number of work-streams. Closely related to the sustainability issue is the question of adequacy of entitlement inherent in pension systems. The sub-committee has established a Task Force on Adequacy, which has recently started work. The intention is to work collaboratively with the Social Policy Committee of the European Council (which has representatives of national governments) and DG Employment in tackling some specific topics that are part of the very broad potential agenda of adequacy issues. Several members of the task force also wear different hats as representatives of their countries on relevant EU Committees and sub-committees.

4.3 Tracking services

Another small task force was established to work on "tracking services". These are systems developed in different countries to enable individuals to find out their entitlement to pensions from a variety of different sources, including social security, occupational pensions and sometimes also personal pensions. The first report of this task force focused on tracking services in Denmark, Finland, Sweden and the Netherlands, where we knew there were well-established on-line tracking services already in place. This report was published in October 2013 and was greatly appreciated by DG Employment, which has a major project underway to look into tracking services and to point the way towards future European-wide

tracking services. The chair of the task force, Jeroen van den Bosch, received several invitations to speak at high-profile European pension events, and he has also developed a strong working relationship with the consortium, which the EU is funding to produce a major report on tracking services. Following the success of the first report, the task force has now regrouped with membership of actuaries from a number of other EU Member States and has begun work on a second report, which will look at what has been done – and what are the aspirations and the obstacles – regarding the development of tracking services in those countries.

4.4 Projection methodology

Another task force was established to look in detail at the methodology that had been used for the cash-flow projections of pension expenditure, which had been published in the 2012 Ageing Report. We would regard making such projections as actuarial work, but in practice the projections are carried out by actuaries in only a minority of Member States. Also, because of the desire of the Economic Policy Committee of the European Council (and ECFin, the relevant DG of the European Commission that works on the projections) to maintain consistency across the 28 Member States, the projections are required to be carried out using stylised demographic assumptions developed by Eurostat, and many aspects of the projections are specified by DG ECFin. This reduces the scope for Member States to take into account legitimate differences between countries and also sometimes makes the projections rather artificial – for example, when they ignore best estimates of the impact of planned reforms.

The task force prepared a short report, which in this case was not made public but was shared with officials at DG ECFin and with members of the Ageing Working Party. The Groupe initiative was not welcomed unreservedly, as there was suspicion as to our motives for getting involved, actuaries being perceived as representing private sector industry interests, and most other such European organisations being established with an explicit lobbying remit. We also engaged directly with the statisticians at Eurostat in Luxembourg in order to understand better the way in which they developed the assumptions for the demographic projections that Member States were required to use for the projections exercise. Although a realistic assessment would be that our impact so far has been limited, some changes are being introduced that we feel have arisen, at least in part, from our interventions, both in the approach to the demographic projections and in the projections of pension expenditure. A new phase of work is currently under way for the task force to distil from the new

ISAP2 model actuarial standard,¹⁰ promulgated by the International Actuarial Association, some pointers to ways in which the reporting of the EU projection exercise could be brought more in line with best international actuarial practice.

4.5 Consumer protection for individual pensions

A further area of activity has been to respond to a consultation paper from another part of the European Commission, DG Sanco, which deals with Consumer Affairs and Health. This concerned consumer protection in respect of pillar 3 pensions (personal pensions sold without the involvement of an employer). Whilst this might more naturally have been handled by the Pensions Committee, or by the recently established Consumer Affairs Task Force, in practice the Social Security Sub-committee was ready and available to take up the challenge, following a meeting which had been held to establish relations with DG Sanco. We also responded to a parallel consultation by EIOPA on the regulation of pillar 3 pensions.

4.6 Improved branding for the actuarial profession

Some of the feedback we obtained from meetings arising out of these initiatives included the relative obscurity of our name – Groupe Consultatif Actuariel Européen (which was shorthand for the full name Groupe Consultatif Actuariel Européen des Pays des Communautés Européennes). This name may have served its purpose in the early years of the group, where it responded to political sensitivity within the member associations about the importance of subsidiarity¹¹ and the need to avoid any implication that a new association was being formed that would take over from national associations or diminish their role. However, with 35 years of experience of operating as the Groupe Consultatif, and in the light of the expansion of the Groupe's public affairs activities into new areas, it was decided by the Groupe at its General Assembly in Dublin in September 2013 to change the name to the Actuarial Association of Europe. Nothing has changed in respect of the principle of subsidiarity, but it is believed that the new name (and the new initials AAE, in both English and French) will serve us better in public affairs representation, since it gives a clearer and more transparent branding for European actuaries.

4.7 Serving the public interest

It is still early days in the development of the broader public affairs role of the AAE but we are encouraged by the impact of the steps taken so far, and we look forward to continuing to develop and promulgate material that will open up doors for us to promote the public interest role of the actuarial profession. In similar terms to the vision of the IAA, the AAE has adopted the following as a part of its mission statement:

To enhance the role of the AAE, on behalf of the actuarial profession in Europe, as an objective, independent, professional, leading adviser, contributor and spokesperson to European institutions and stakeholders on all matters of actuarial relevance, widely recognised and respected in this role, in pursuit of the public interest.

The work of the Social Security Sub-committee is seeking to achieve this mission in the vital area of social security and pension policy.

5 CONCLUSIONS

This short paper illustrates the challenges facing the actuarial profession in achieving relevance in public affairs interventions in the complex geopolitical environment of the EU. Whilst the governmental agencies with which the AAE has engaged command far more extensive resources than our struggling volunteer efforts, targeted and insightful contributions from the actuarial profession which seek to educate, inform and raise relevant issues on topics which actuaries understand well have been highly appreciated and welcomed by both officials and elected members and have significantly raised the profile of the profession. Although undoubtedly complicating the articulation of a common actuarial view, the involvement of actuaries from more than a dozen countries has added credibility to the AAE as a truly European contributor on key issues.

The Australian environment is obviously very different, and the Actuaries Institute has to focus on only one government's superannuation policy, but it is nevertheless important for the profession to speak out and make informed contributions on major issues of

10 International Actuarial Association (2013). International Standard of Actuarial Practice 2 (ISAP2) Financial Analysis of Social Security Programs. http://www.actuaries.org/index.cfm?lang=EN&DSP=PUBLICATIONS&ACT=STANDARDS_ISAP

11 The term 'subsidiarity' refers to the governance principle of accepting that member associations have primary responsibility in their areas of competence and that the international body should only act in relation to matters at the international level where it is difficult or less efficient for the member associations to act directly. The IAA also operates a similar principle of subsidiarity with respect to its member associations.

public affairs, especially on the adequacy, sustainability and coherence of policies affecting the income of older citizens.

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Research highlights from the International Congress of Actuaries 2014

BRIDGET BROWNE



Bridget Browne

A broad range of research relevant to actuaries in all areas of practice was presented at ICA2014. The following are just a few highlights. The full program, presentations, papers and recordings are available at <http://www.ica2014.org/>.

DEPENDENCY – A SOBERING REMINDER

In his plenary session, Paul Embrechts of ETH Zurich spoke eloquently on the topic of uncertainty. He quickly moved into fairly specific territory, addressing some of his work on uncertainty in dependence structures (which he called model uncertainty) and direct consequences for capital modelling in particular. This was elaborated on in a parallel session, where he discussed the relative merits of value at risk (VaR) and expected shortfall (ES) as measures of extreme adverse outcomes and demonstrated the enormous range of the resultant capital required from the “best” to the “worst” dependence structure. The clear message: the “worst” dependency outcome for the VaR or ES of an aggregated portfolio of risks is substantially more than the sum of the individual measures. The sessions and the accompanying paper are a fairly accessible reminder of the pitfalls of an incomplete understanding of dependence structures.

INDIVIDUAL EQUITY AND COLLECTIVE RISK SHARING – WHERE DOES INSURANCE SIT?

“Predictive modeling – too much of a good thing?”, presented in the form of a debate between Professor Rob Brown, current President of the International Actuarial Association, and Roosevelt Mosley, Principal & Consulting Actuary, Pinnacle Actuarial Resources, Inc, was a highly entertaining discussion on a key issue for both the insurance industry, and actuarial practice and professionalism. The session raised important questions about the extent to which the individualisation of risk rating that may be enabled by predictive modelling could fundamentally undermine the collective, risk-pooling, principle of insurance.

MORTALITY MODELLING

In this very active field of actuarial research, a broad range of presentations were made, demonstrating the diversity of views and approaches being taken to model this key risk.

Professor at the School of Public Health, University of Illinois at Chicago, S. Jay Olshanky's plenary session covered his research on possible limits to the extension of life expectancy and presented the "longevity dividend" concept, which advocates a focus on "slowing the ageing process" by aiming to extend healthy life expectancy. Following this session were a multitude of parallel sessions discussing different aspects of mortality projections and longevity risk (e.g. sessions 13, 37, 43), including analysis of past patterns and variations in mortality by age, gender, cohort, period, cause of death, and geographic and socio-economic factors. New projected (or generational) mortality tables from both the Society of Actuaries and the Canadian Institute of Actuaries were presented. These are valuable references that may be applicable to the Australian situation in the absence of equivalent local data sources.

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