Forced savings and annuitisation with cross-subsidies: a mutation of the beast

Benjamin Avanzi [a,1,*], Sachi Purcal [a,2]

[a] *Actuarial Studies, Australian School of Business*
UNSW Sydney NSW 2052, Australia

Abstract

We adopt a two-tiered economic approach to classify national retirement savings schemes. We extend the plain vanilla system of forced savings by allowing for annuitisation and cross-subsidies.

The first tier of our model is controlled by government, which mandates contribution rates, interest rates, and conversion into benefits. In contrast, agents make voluntary contributions in the second tier, which earn interest at a rate broadly reflecting market conditions and any cross-subsidy between both tiers. Cross-subsidies within the mandated tier and between both tiers allow for social redistribution as well as the creation of a liquid market of privately provided annuities.

We conclude with a discussion of the Swiss and Australian systems of retirement savings as seen through the lens of our model.

Key words: mandated retirement savings, annuitisation, pensions, regulation
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* Corresponding author. Tel.: +61 2 9385 9844; fax: +61 2 9385 1883.
Email addresses: `b.avanzi@unsw.edu.au` (Benjamin Avanzi), `s.purcal@unsw.edu.au` (Sachi Purcal).

[1] Benjamin Avanzi, PhD, is a member of the Swiss Association of Actuaries and an affiliate member of the Institute of Actuaries of Australia.

[2] Sachi Purcal, PhD, is an Associate of the Society of Actuaries.

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1 Introduction

Setting up a system for retirement income provision belongs to the most basic agenda of governments around the world. Mandating a minimum level of contribution towards retirement savings is one facet of an approach to this problem, and is part of a strategy to protect the old endorsed by the World Bank (World Bank, 1994). Furthermore, incentives to build up non-mandated savings for retirement—such as through tax concessions, are also common. The motivation of such schemes is to encourage agents' *own* provision of retirement income, reducing the burden to government of costly income provision. But the story does not end here. In addition to encouraging agents' savings for retirement, the state is also concerned with other issues, one of which is how agents deal with their longevity risk.

The "annuity puzzle" stems from the observation that there is surprisingly small demand for voluntary lifetime annuities throughout the world (Purcal and Piggott, 2008). While the U.K. is the world's largest market for immediate lifetime annuities (some GBP £12 billion of business was written in 2005), the principal driver for this market is the compulsory annuitisation at retirement of tax-efficient defined contribution personal pension plans. In contrast, in the U.S. there is no such compunction to annuitise. Although vast sums flow into U.S. annuities markets (USD $301 billion in 2004), almost without exception these funds find their way into tax-sheltered deferred annuities, with scant amounts ever being actually annuitised—the overwhelming proportion are withdrawn as lump sums. The market for voluntary lifetime annuities in Australia, on the other hand, is transparently tiny. There, in 2008 only some AUD $11.9 million, involving a miniscule 61 contracts generated a paltry AUD $560 000 [3] of income flow (Plan for Life Research, 2008).

One remarkable exception to this widespread trend is the case of Switzerland. There almost two-thirds of retirees freely *choose* to convert their accumulated retirement savings—including a substantial component of voluntary savings—into a lifetime income stream; only a quarter (Bütler, 2003) select a lump sum. Recent figures indicate 78% of the income of the aged stems from annuities (OFS, 2007), of which slightly less than half comes from second pillar savings.

In this paper, we try to capture the essence of this surprising retirement system, a system that not only involves a high degree of annuitisation, but also achieves this entirely through private provision, with remarkably stable annuity prices. The Swiss model is organised in two cross-subsidised tiers. In fact, forced savings create *de facto* two tiers: one of mandated savings, and one of excess (non-mandated)

[3] Approximately USD $10 million and USD $470 000, respectively.

savings. Noting this naturally leads to the description and taxonomy of the family of two-tier systems of mandated retirement savings with (possible) cross-subsidies.

In Section 2, we develop a simple economic model that considers both tiers explicitly. In an attempt to understand how the Swiss system works, the model also allows for cross-subsidies between the mandated and non-mandated tier, as well as a mechanism (controlled by the state) to encourage annuitisation of mandated savings. This development is crucial for our analysis. In Section 3, we develop a taxonomy of this family of two-tiered retirement systems. The interaction between both tiers as well as the demand for annuities is analysed for each type of model. Examples are discussed in Section 4, where both Swiss and Australian retirement systems are examined through the lens of our taxonomy. Section 5 concludes.

2 An economic model of forced savings with cross-subsidies

2.1 Economic landscape

Consider an economy where agents may save a portion of income in an organised system of retirement savings during n years of their life. At the end of these n years, everyone retires. Thus if agents can contribute from the age of 18 and the ordinary age for retirement is 65, then n is equal to 48.

We assume agents have an average salary of amount w_k in year k, $1 \leq k \leq n$. The proportion of the active population in year k is denoted by α_k with $\sum_{k=1}^{n} \alpha_k = 1$ (without loss of generality).

Furthermore, we assume that the long term return on investments (market rate) is equal to r^* p.a. (a constant). Our aim is to model the long term effect of the model, and it is reasonable to assume a stable (real) market return in the long term.

2.2 Retirement savings

We model the level of savings of agents at the macroeconomic level. The government creates a two-tier system of retirement savings.

With respect to the first tier, the 'mandated component', agents must contribute savings to this at rate β_k of their income w_k, $1 \leq k \leq n$. Mandated savings accumulated in this way earn interest at a rate of r p.a. As with r^*, we assume r is expressed in real terms. At retirement, agents can choose between a lump sum payment or a life annuity. If they choose an annuity, the accumulated amount of their

mandated savings is multiplied by a conversion rate ξ (gazetted by government) to yield the annual rate of decumulation of the life annuity. These annuities are sourced from private sector annuity providers. The (possible) difference between ξ and the actuarially fair conversion rate is denoted by Δ, which we initially assume to be positive or null. A positive difference ($\Delta > 0$) means the creation of the life annuity has contributed to a deficit of resources on the part of the provider. Furthermore, we assume that if $\Delta > 0$ all agents annuitise, whereas if $\Delta = 0$ they are indifferent between the income stream and single payment options. The accumulation and decumulation of this first tier is entirely controlled by the government. The law defines β_k and ξ (which are stable over time) and the government decides on r each year. The overall level of mandatory savings is then

$$M = \sum_{k=1}^{n} \alpha_k \sum_{l=1}^{k} \beta_l w_l (1+r)^{k-l}. \tag{1}$$

Note that we assume here that r has been constant for the past n years, even though the government can modify this figure every year. However, as we are interested in the long term effect of a given constellation of parameters, it is reasonable to assume that r will remain constant (in real terms) if the government policy is stable.

Each year, a proportion α_n of the active population retires. Their mandatory savings

$$\alpha_n \sum_{l=1}^{n} \beta_l w_l (1+r)^{n-l}$$

can be expressed as a (constant) fraction

$$\rho = \frac{\alpha_n \sum_{l=1}^{n} \beta_l w_l (1+r)^{n-l}}{\sum_{k=1}^{n} \alpha_k \sum_{l=1}^{k} \beta_l w_l (1+r)^{k-l}} \tag{2}$$

of the overall mandatory savings M.

The second tier of this retirement savings model concerns non-mandatory savings. It differs from a standard savings account in several ways. Contributions are encouraged in some way (typically by provision of tax concessions on these payments), providing a powerful incentive to save for retirement via this vehicle. It is here the costs the system arise to the state. Along with mandatory savings, non-mandatory savings in this scheme are, in principle, inaccessible until retirement. We further assume these factors induce agents to contribute to their non-mandatory component at a (constant) rate γ on w_k, $1 \leq k \leq n$. Non-mandatory savings earn interest at a rate r' p.a. It is reasonable to initially assume some bound on r', say

$$r' < r^*, \tag{3}$$

otherwise agents could save money in a goverment supported environment (for example, with tax-free investment earnings), and effectively earn a much higher rate of return on investment than r^*. The level of non-mandatory savings is then

$$NM = \sum_{k=1}^{n} \alpha_k \sum_{l=1}^{k} \gamma w_l (1 + r')^{k-l}. \tag{4}$$

The variable r' is endogeneous. How this rate is determined is explained in the next two sections. On retirement, agents receive their non-mandated accumulation as a lump sum or as an actuarially fair annuity (at a rate $\xi - \Delta$), again sourced from a private sector provider. The cost of either option is neutral.

2.3 Cross-subsidisation in the two tiers

We assume a closed, autarkic system. Thus, with no further subsidies to or leakages from the national retirement savings scheme, we must have

$$r^*(M + NM) = rM + \Delta\rho M + r'NM, \tag{5}$$

because M and NM are both invested in order to yield the long term rate r^*. The interest earned on the retirement savings $(M + NM)$ is used to remunerate M at the rate r and compensate the cost of annuitisation $\Delta\rho M$, should it be subsidised $(\Delta > 0)$. What is left represents the interest on the non-mandated component. Reorganising (5) yields

$$\begin{aligned} r' &= r^* \left(1 + \frac{M}{NM}\right) - \frac{M}{NM}(r + \rho\Delta) \\ &= r^* - \frac{1}{\gamma}(\rho\Delta + r - r^*) \cdot f(r'), \end{aligned} \tag{6}$$

where

$$f(r') = f(r'; r, n, \alpha_1, \ldots, \alpha_n, \beta_1, \ldots, \beta_n) = \gamma \frac{M}{NM}$$

is a decreasing function of r' that is independent of γ and for which

$$\frac{\mathrm{d}}{\mathrm{d}r'} f(r') = \frac{f(r')}{1 + r'} \tag{7}$$

holds. Equation (6) means that the net rate r' is equal to the market rate r^*, corrected by a certain factor. We can further develop (6) into

$$r' = r^* - \frac{\pi}{\gamma} \cdot f(r') \tag{8}$$

$$= r^* - \frac{\pi M}{NM}, \tag{9}$$

where

$$\pi = \rho\Delta + r - r^*. \tag{10}$$

In order for condition (3) to hold, π must be positive. The variable π is the net cost (as a rate of M) of the variables mandated by the government r, Δ and β_k (hidden in ρ). It is also the rate of cross-subsidisation of the mandated tier. The product πM in (9) is the global amount of subsidies, which is apportioned evenly to the mass NM as a correction to the market rate r^*. Note that if π is negative, the non-mandated tier is subsidised and $r' > r^*$.

2.4 Dynamics of the closed system

As explained in the previous section, the system is self contained. This is achieved by adjusting the return r' on non-mandated savings—the only endogenous variable. In this section, we study how the main variables influenced by the government γ (a result of incentives such as tax concessions) as well as π (a result of the mandated parameters r, Δ and β_k) interact with r'.

A simple expression for γ stems from (8):

$$\gamma = \pi \frac{f(r')}{r^* - r'}. \tag{11}$$

The interaction between r' and γ is not obvious. If r' decreases both numerator and denominator in (11) decrease. Furthermore, r' and π are inter-related. In order to study these relations we use the following well known identity:

$$\frac{\mathrm{d}x}{\mathrm{d}y} = -\frac{\partial g(x,y)/\partial y}{\partial g(x,y)/\partial x}, \tag{12}$$

where $g(x, y) = 0$ is a continuous, once differentiable function on the range of x and y. A natural choice for this function is (8)—which is derived from the closed system equation (5). Hence, we define

$$g(r', \pi, \gamma) = r' - r^* + \frac{\pi}{\gamma} f(r') = 0. \tag{13}$$

For convenience, we begin by determining

$$\frac{\partial g}{\partial \pi} = \frac{f(r')}{\gamma} = \frac{r^* - r'}{\pi}, \tag{14}$$

$$\frac{\partial g}{\partial r'} = 1 + \frac{r^* - r'}{f(r')} f'(r') = \frac{1 + r^*}{1 + r'}, \tag{15}$$

$$\frac{\partial g}{\partial \gamma} = -\frac{\pi}{\gamma^2} f(r') = -\frac{r^* - r'}{\gamma} = -\frac{(r^* - r')^2}{\pi f(r')}. \tag{16}$$

Let us first examine the effect of γ on r'. We have

$$\frac{\mathrm{d}r'}{\mathrm{d}\gamma} = -\frac{\partial g/\partial \gamma}{\partial g/\partial r'} = \frac{r^* - r'}{\gamma} \left(\frac{1 + r'}{1 + r^*} \right) = \frac{(r^* - r')^2}{\pi f(r')} \left(\frac{1 + r'}{1 + r^*} \right), \tag{17}$$

which will have the same sign as π. If $\pi > 0$, agents will have an incentive to save more in the non-mandated component, as an increase in γ will translate into an increase in r'. Similarly, they have a disincentive to reduce their contribution, as this will reduce the return on their existing (usually inaccessible) non-mandated savings. On the other hand, if $\pi < 0$, cross-subsidies to the non-mandated tier translate into $r' - r^* > 0$. This positive spread is a result of the dilution of the (constant) cross-subsidy into non-mandated savings and it will be smaller as the amount of non-mandated savings (i.e., γ) increases, which explains intuitively why (17) is negative in this case.

The sign of

$$\frac{\mathrm{d}r'}{\mathrm{d}\pi} = -\frac{\partial g/\partial \pi}{\partial g/\partial r'} = \frac{r' - r^*}{\pi} \left(\frac{1 + r'}{1 + r^*} \right) < 0 \tag{18}$$

is obvious from (8). There always will be a trade off between π and r'.

Finally, consider the relation between γ and π,

$$\frac{\mathrm{d}\gamma}{\mathrm{d}\pi} = -\frac{\partial g/\partial \pi}{\partial g/\partial \gamma} = \frac{\gamma}{\pi} = \frac{f(r')}{r^* - r'}, \tag{19}$$

which will have the same sign as π. Note that this is to be interpreted ceteris paribus, that is, *for a given level of* r'. If $\pi > 0$, more non-mandated savings are needed in order to increase π. Conversely, a higher level of non mandatory saving allows a higher level of cross-subsidies to the mandated tier for given r'. If $\pi < 0$, an increase in π translates in a decrease of the subsidies to the non-mandated tier. This requires less non-mandated saving in order to keep r' constant.

3 Manifestations of forced savings: a taxonomy of the beast

3.1 Introduction

As we discussed in the introduction, one reason for a country to encourage retirement savings is to encourage agents' own provision of retirement income. However, the model we introduced in Section 2 suggests that the two-tiered structure introduced by mandated savings allows us to achieve much more than that. Below we discuss how it can induce social redistribution, foster a liquid private market for life annuities, as well as achieve increased security with respect to the retirement income of agents.

The sign of π represents a redistribution of the investment flows arising from M and NM. Furthermore, the government can choose who will have mandated savings through its setting of β_k. These can be a function of age and income, for instance. For a fixed value of π, changes in Δ, and thus of r in the opposite direction, translate into social redistribution between active agents and newly retired agents within the mandated tier.

Furthermore, a positive Δ encourages annuitisation and makes the choice of decumulating mandated savings in the form of a life annuity rational. As a corollary, this can create a liquid market of privately provided life annuities, and this without forcing annuitisation at any stage. Since the additional cost incurred by $\Delta > 0$ is allowed for in the system (see (5) above), the provision of such favourable annuities is cost neutral to the provider: other model parameters are subsequently adjusted, such a reduction in either r or r'. Taken together with the management of the vast mass of (relatively stable) retirement savings, this is likely to interest private insurers in participating in such a scheme. Insurers can then also offer annuitisation of the non-mandatory component of the retirement savings at an actuarially fair rate of conversion, as the critical mass for a healthy portfolio of life annuities has been reached and it will further help mitigate their risk through diversification and a higher number of annuities.

Finally, a stable rate of annuitisation ξ and rate of return r provide security and stability for agents with mandated retirement savings. Their accumulation and decumulation are largely predictable (even deterministic for given income, r and ξ). Hence, agents can plan on a secure retirement income as they approach retirement, and need not fear substantial market alterations such as that observed in the current financial crisis.

In the next section, we use our model to present a systematic way of viewing how these parameters fit together to meet different goals. Drawing on the results

discussed in Section 2.4, we also provide some qualitative comments on the level of non-mandated savings in this family of models.

3.2 A taxonomy of mandated saving schemes

From the discussion above we identify two categories of choices that will lead to essentially different systems.

The first choice is on the sign of π. The question here is whether there will be cross-subsidies between M and NM or not. If there are, transfers are organised from one tier to the other by choosing $\pi \neq 0$, the scope of the mandated tier being determined by the β_k's. If $\pi = 0$ there are no cross subsidies between the tiers.

The second choice is on the sign of Δ. The so-called "annuity puzzle" suggests that if $\Delta = 0$, agents won't choose to annuitise their retirement savings. The question is thus whether newly retired agents will annuitise ($\Delta > 0$) or not ($\Delta \leq 0$). Note that the case $\Delta < 0$ reduces to the case $\Delta = 0$, because in this case no one will annuitise (as this is not mandatory) and thus it is reasonable to assume that no revenue associated with unfair annuitisation will be provided in our closed system.

Note that none of these additional features expose the government to other costs than the ones related to the incentives to non-mandated saving (such as tax concessions) and regulation, costs that exist anyway in the simplest two-tiered retirement savings system.

3.3 First tier (mandated savings) subsidised by second tier ($\pi > 0$)

3.3.1 Absence of annuitisation $\Delta = 0$

Here the government opts to subsidise those with mandated savings by (exclusively) raising their return on investment. We observe $r > r^*$, which leads to a positive π. The cost of the transfer is borne by agents with non-mandated savings.

3.3.2 Presence of annuitisation, $\Delta > 0$

Under this solution, the government wishes to encourage annuitisation of mandated savings, which also fosters the creation of a liquid market of privately provided life annuities. Agents are likely to be able to annuitise their non-mandated savings as well, should they wish to do so.

The government could still decide to mandate higher returns on M by setting $r > r^*$. Conversely, if the cost of annuitisation at ξ is partly financed by a reduction in r ($r < r^*$), there is also a social redistribution from actives to newly retired agents

within the mandated tier. However, this redistribution must less than compensate the cost of annuitisation in order for π to remain positive.

This is the most flexible and "all inclusive" two-tiered model presented in this paper, but it is also the most complex to monitor.

3.3.3 The need for non-mandated savings

In order to work properly when $\pi > 0$, the system needs a substantial level of non-mandatory savings. This may seem paradoxical, and even dangerous, as non-mandatory savings are ... not mandated!

However, we found in Section 2.4 that agents with non-mandated savings will always have an incentive to save more in this instrument, and a disincentive to reduce their contribution rate γ, as this would reduce the return on their existing (inaccessible) non-mandated savings. An appropriate choice of both π and tax breaks, together with the other advantages and constraints of participating in NM, is likely to lead to an equilibrium that is not a corner solution.

3.4 Absence of cross-subsidies ($\pi = 0$)

3.4.1 Absence of annuitisation $\Delta = 0$

The government mandates a minimum level of savings according to the β_k's. There is no redistribution between M and NM ($\pi = 0$) and no redistribution within M ($\Delta = 0$).

This is the simplest two-tier system with forced savings. Henceforth, we refer to it as to the "base case". It is observed in many countries with limited non-mandated savings and thin life annuities market.

3.4.2 Presence of annuitisation $\Delta > 0$

The cost of annuitisation is entirely (and exactly) compensated by a reduction of r ($r < r^*$) which leads to a social redistribution from actives to newly retired agents again. However, the effect is globally neutral as the disadvantages during active years are collectively compensated by the advantage granted at retirement (if all parameters remain constant). Furthermore, the presence of annuitisation ensures a liquid market of life annuities, and this without any need for non-mandated savings.

3.4.3 The level of non-mandated savings

In the absence of cross-subsidies there are no transfers between tiers. Non-mandatory savings will primarily respond to forces that are external to our model. Although such savings are not essential if $\pi = 0$, they will be necessary if the government wants to move to a situation with $\pi > 0$.

3.5 Second tier subsidised by the first tier ($\pi < 0$)

We include this section not for completeness, but for its intrinsic merit. Of course, mandating savings and then introducing transfers from mandated savings to non-mandated savings may appear odd. Two reasons suggest themselves for why this may occur. Firstly, π and Δ might fall into one of this cases *by accident*, say by estimating some key parameters wrongly—such as r^* or the actuarially fair conversion rate. Secondly, such circumstances may be the express wish of a state who chooses to transfer wealth from mandated savers to non-mandated savers.

3.5.1 Absence of annuitisation $\Delta = 0$

In this case $\pi < 0$ means that $r < r^*$. Some of the returns on M are apportioned evenly to non-mandated savings. Agents are thus mandated to save at a rate β_k and then penalised on their returns. If Δ is knowingly set as null this situation makes sense if government wishes to tax mandated savers, targeting the cross-subsidy at non-mandated savers. This creates a further incentive for non-mandated saving, as perhaps an alternative to tax concessions.

3.5.2 Presence of annuitisation $\Delta > 0$

Newly retired agents enjoy annuitisation at an advantageous rate thanks to internal subsidies from active agents in the mandated tier, but the reduction in r more than compensates the cost of annuitisation at ξ. The resulting profit is distributed to agents with non-mandated savings. This is likely to happen by accident if the government meekly sets r or Δ in response to insurer lobbying and as a result proves to be too low.

3.5.3 The level of non-mandated savings

If π is negative, agents get a higher return on their non-mandatory savings than the market rate and could possibily also enjoy tax concessions, and this whatever the level of non-mandated savings is. A very high level of non-mandated savings is thus to be expected, even though (17) is negative.

4 A tale of two cities

In this section, we move from the theoretical domain and examine two retirement systems that lie at both ends of the spectrum of our taxonomy. The first one, the model that is implemented in Switzerland, is organised according to Section 3.3.2 ($\pi > 0$ and $\Delta > 0$). The second one, the model that is implemented in Australia, is organised according to our base case ($\pi = \Delta = 0$). Our discussion of the first system highlights both the successes and the challenges that have arisen in implementing a model of forced saving with annuitisation and cross subsidies. The treatment of the second system teases out the issues associated with transition from the base case to the richer structure including annuities, highlighting the essential components of a model of forced saving with annuitisation and cross subsidies.

4.1 Bern

When forced savings were introduced in 1985, Switzerland already had accumulated a substantial amount of retirement savings (Hepp, 1998). Existing savings were assimilated into non-mandatory savings, providing the necessary initial reservoir required to immediately introduce a positive π. In addition, non-mandated savings enjoyed both a legal guarantee and the same level of tax concessions granted to mandated savings, sweetening Swiss attitudes to this avenue of saving.

At retirement, annuitisation is the default choice (on both tiers) and is the usual outcome for retiring Swiss. Pension funds can offer the option to take the capital as a lump sum and the vast majority of them do. With respect to annuitisation, the conversion rate ξ is in fact a richer package of a lifetime annuity, a survivor annuity, and immediate annuities for children. These additions are mandatory. A positive Δ thus makes annuitisation of one's M the rational choice, especially for married agents with or without children. [4]

Contribution rates to the mandatory tier have never been modified, with the exception of the postponement of the ordinary retirement age for women. Agents can contribute from the age of 18 to the age of 65 (64 for women). The contribution rates β_k are positive from the age of 25 and increase until retirement. In addition, they focus on low to medium incomes. Higher tranches of income can only contribute to the non-mandatory component.

[4] See Bütler and Teppa (2007) for a money's worth analysis and empirical study of the decision of annuitisation in Switzerland. Avanzi (2009) describes the Swiss retirement system in detail and also explores the reasons why the Swiss annuitise.

In 1985, Δ was arguably null. However, the rate r was set at 4% (and did not change until 2002) which led to a positive π from the beginning. The system introduced was then of the type described in Section 3.3.1. As time went by, improvements in mortality rates together with a fixed ξ increased Δ, which was (substantially) positive by the turn of the century. The system had moved to the one of Section 3.3.2.

On the top of having a healthy privately provided life annuities market, non-mandatory savings are substantial, and Switzerland is one of few countries with an amount of savings exceeding its gross domestic product (Gerber and Weber, 2007). In 2003, newly retired households achieved a replacement rate of 61.2% of income flows (OFS, 2007). This last proportion (ceteris paribus) is expected to increase as the system needs another 15 years before agents retire with a complete contribution period.

Outwardly, the Swiss system seems to be a success story. For twenty years the system chugged along without requiring any action from the government, but the Swiss system is currently facing some difficult issues.

These began with the financial crisis of the beginning of the century. Private insurers saw the returns on retirement assets plummet, whereas both r and ξ remained constant. Compounding the issue was the then common practice of offering annuitisation of non-mandated savings at the rate ξ as well. Private insurers abruptly changed the terms on which they annuitised non-mandated savings to offer only a (regulated) actuarially fair rate—rather than ξ. Furthermore, they lobbied the government for a reduction in the minimum rate of interest r on mandated savings. This prompted indignation from interest groups representing active insureds who pointed out the one-sided nature of the change: it seems no insurer had asked for increases of r during the golden years. Notwithstanding, the government decreased r and has changed it every year since then [5]. Also, the first (progressive) decrease of ξ was enacted, although still leaving Δ well above 0.

The current global financial crisis has put further pressure on the system. It is in crisis as the government has been unable to introduce a systematic method to set r. Instead it is now the result of lobbying between factions. A further reduction of ξ (and thus of Δ) is currently under discussion in the political arena and will be decided in a referendum in 2009 or 2010.

Overall the state of the debate suggests a general misunderstanding of how the system works. Our paper provides guidance.

All in all, in order for the system to keep its current qualities, π has to remain

[5] The rate was decreased to 3.25% in 2003, 2.25% in 2004, 2.5% from 2005 to 2007, 2.75% in 2008 and is currently 2% in 2009.

positive and there is thus a need for Δ to be positive and r to be high. The current arguments of the government are to the converse. Furthermore, a positive Δ is also crucial if Switzerland wants to keep its (exceptionally) healthy annuities market. Inertia together with cultural proclivities would probably allow this market to survive for some time if Δ was to become null (or even negative), but not forever.

The government needs to monitor the parameters π, Δ and r in a systemic way. In particular, it needs to be careful if it wants to avoid making π negative. How positive the level of π is set is essentially a political choice. As discussed in Section 3.3.3, this choice is the one of better subsidised annuities for lower income agents *versus* higher returns on non-mandated savings (arguably for higher income agents) with the caveat that non-mandatory saving must remain encouraged (at the cost of tax concessions).

4.2 Canberra

Australia introduced its system of mandatory second pillar retirement saving (known as the Superannuation Guarantee) in 1992.[6] One of the aims of its introduction was the common desire for an expanded role for private provision of retirement benefits.

The retirement systems described in Sections 3.3.2 and 4.1 above involve a mandated second pillar with retirement income streams provided by private life annuity suppliers. This is attractive to Canberra as it is in harmony with its private provision goals, as well as offering an opportunity to introduce a system geared towards provision of retirement income streams, rather than the current typical Australian practice of retirees taking lump sum benefits. Lump sum benefits provide no longevity insurance and further permit retirees to manage their affairs in such a way as to maximise entitlement to Australia's first pillar (means-tested) age pension. In this section we explore the possibility of Canberra drawing closer to Bern.

An important consideration with respect to the retirement systems described in Sections 3.3.2 and 4.1 above is that an adequate supply of non-mandatory saving exists in the second pillar. Could Canberra ensure this supply would exist following a change toward such retirement systems? On the positive side, we have noted in the previous section that Bern's introduction of its current retirement system involved taking already existing second pillar retirement savings to create the non-mandatory savings of the current two-tiered model. Canberra could take a leaf out of Bern's book and turn the pool of existing savings into an initial pool of

[6] For a description of the Australian retirement system, see Bateman et al. (2001).

non-mandatory savings, required in the model outlined in this paper.

Numerous concerns exist as to whether Canberra could continue to maintain an adequate supply of non-mandatory savings. Currently, the two primary vehicles for tax preferred saving in Australia are superannuation (retirement savings) and owner-occupied housing. The latter receives both favourable income tax treatment and is excluded from the first pillar age pension means test, making it—in the absence of mandated retirement saving—the probable destination of private savings. Clearly, willingness to participate in non-mandatory savings also depends on the first pillar of the retirement system, its integration with the second pillar and relevant tax concessions.

Australians have been accustomed to controlling their retirement savings, having the ability to choose how their superannuation funds are invested in the accumulation phase and, in the most common case where a lump sum retirement benefit is taken, choosing how retirement savings are spent. This may work against the need to accumulate a sufficient pool of non-mandatory second pillar savings, as the loss of control of investing in such a pool and its ultimate conversion into a life annuity may prove unpopular.

One of the outcomes of the Swiss second pillar retirement system is a very large private annuities market. Private institutions hold reserves for these annuities that are roughly half Swiss GDP. If Canberra decides to move towards a retirement system with default annuity provision it needs to ensure annuity providers have access to the financial instruments they need to supply life annuities. However, one thing annuity providers lack are good quality assets to match their annuity liabilities. In recent years the Australian government has been running budget surpluses, and as the government moves more and more into surplus it is generating less and less debt. The result is a lack of good quality long term debt to back annuities.[7] Any move to increased annuitisation in Australia would have to address such limitations.

5 Conclusion

In this paper, we have systematically analysed a system of retirement saving consisting of two tiers—one of mandatory saving, the other of non-mandatory saving—which offers the option of fostering annuitisation and introducing cross-subsidies. Such a model is an extension of a plain vanilla system of mandated saving (exemplified, for example, in Australia), and is in fact in existence in Switzerland. The system has advantages in encouraging a burgeoning private sector life annuities

[7] The current global financial crisis has reversed this trend.

market, with the attendant benefits of longevity insurance. This is at the cost of tax concessions to attract a flow of non-mandated savings into the system, which are used to subsidise the provision of annuities on mandated savings at actuarially favourable terms.

The short case studies discussed in Section 4 highlight the difficulties associated with evolution from one system to another. Many conditions need to be considered with respect to the nature of transition that are not discussed in this paper. Possible issues arise in the tax system, the overall structure of social security system, the financial market, as well as the cultural background of the country that is considered. Our model itself is simple and static, and questions about its dynamics and stability need to be considered. This calls for further research to refine the analysis.

References

Avanzi, B., 2009. What is it that makes the Swiss annuitize? A description of the Swiss retirement system. UNSW Australian School of Business Research Papers 2009ACTL06.

Bateman, H., Kingston, G., Piggott, J., 2001. Forced saving: mandating private retirement incomes. Cambridge University Press, Cambridge, U.K.

Bütler, M., 17 March 2003. Mandated annuities in Switzerland. Tech. rep., DEEP Université de Lausanne & CEPR.

Bütler, M., Teppa, F., 2007. The choice between an annuity and a lump sum: Results from Swiss pension funds. Journal of Public Economics 91 (10), 1944–1966.

Gerber, D. S., Weber, R., 2007. Demography and investment behavior of pension funds: Evidence for Switzerland. Journal of Pension Economics and Finance 6 (3), 313–337.

Hepp, S., 1998. Mandatory occupational pension schemes in switzerland: The first ten years. Annals of Public and Cooperative Economics 69 (4), 533–545.

OFS, 2007. Une nouvelle méthode pour l'enquête sur les revenus et la consommation: Nouveau modèle de pondération, résultats 2000-2003 et étude sur la prévoyance vieillesse.

Plan for Life Research, December 2008. The immediate annuity product and rate report. Tech. rep., Plan for Life Pty Ltd.

Purcal, S., Piggott, J., 2008. Explaining low annuity demand: An optimal portfolio application to Japan. Journal of Risk & Insurance 75 (2), 493–516.

World Bank, 1994. Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth. The World Bank, Washington, D.C.