

On the Role of the State in Pension Plans and How Best to Achieve It

Laurent Lassalvy

CAMRI Research Fellow

Email: laurent.lassalvy@gmail.com / CAMRI@nus.edu.sg

Contact Number: +65 6516 4160

July 2011

In this paper we explore the state's role in the pension system and how best to achieve the public objective. A purely private pension system would not take into account externalities; so it is optimal for the state to ensure that all senior citizens receive a basic living pension. This can be achieved with a public pension life annuity paying a fixed percentage of *per capita consumption* (Merton (1983)). There should be a self-funded public pension fund, financed by compulsory contributions set at a level ensuring sufficient disposable income for all workers. All additional pension contributions, investments, and distributions could be managed by the private sector. As a corollary, we propose the government issues consumption-indexed bonds to reduce the public pension fund's asset-liability mismatch, and improve the annuity price discovery process. Implications arising from home ownership and health care needs are also discussed; however the latter is too volatile and unpredictable to be handled within the public pension system. Rather, as is practiced in many countries, including Singapore via its Medisave/MediShield program, it should be financed and implemented through a separate, basic health care insurance scheme.

Introduction

How senior citizens are able to make ends meet is too important an issue for society, especially for the population ageing nations, to be left to the full discretion of each household.¹ As such, the majority of governments are heavily involved in the retirement savings and benefits process, through state pension systems, compulsory retirement savings, benefit programs for retirees and tax incentives amongst others. This article tries to answer two key questions: firstly, what should the objectives of state intervention in the pension system be, and secondly, what are the best mechanisms to achieve these objectives. We will first argue that pensions should aim at guaranteeing a constant standard-of-living for retirees. Secondly, we will discuss a hybrid approach in which public and private pension systems co-exist and supplement each other in ensuring satisfactory revenues through retirement for each citizen. Thirdly, we will explain the need for fixed-income financial products whose cash flows track the national standard-of-living. Finally, we will cover the necessary public pension contributions and important factors which should influence their required level. Although most of the reasoning applies to any country, in some circumstances we will focus our analysis and examples on Singapore.

1) Indexing to the Standard of Living (Consumption) instead of the Cost of Living (Inflation)

The key retirement income issues which concern the average citizen are that they receive a reasonable payment every month which lasts for as long as they live, and which is indexed to his or her standard-of-living.² While many pensions research articles, including Bodie, Cherian and Chua (2011), focus on the cost-of-living (viz. inflation), a better benchmark may actually be the standard-of-living (viz. consumption).³ The nuance, as pointed out by Merton (1983), is subtle but real: assuming that products and prices remain constant over a certain period, but that the quantities consumed double, the cost-of-living is unchanged whilst the standard-of-living has doubled. As such, pension distributions which track cost-of-living could, over time, result in significant divergence between the quality of life of retirees and of the working population.

There is also a difference between maintaining an “absolute” standard of living (i.e., continued ability to purchase the same basket of goods) and a “relative” standard of living (i.e., continued ability to

¹ Population ageing, as defined by the United Nations, is the process by which older individuals become a proportionally larger share of the total population.

² See Bodie, Zvi, Cherian, Joseph and Chua, Wee Kang, Worry-Free Inflation-Indexing for Sovereigns - How Governments Can Effectively Deliver Inflation-Indexed Returns to Their Citizens and Retirees (May 2011), BU/NUS Business School Research Paper No. 2011-11. Available at SSRN: <http://ssrn.com/abstract=1855824>

³ See Merton, Robert C. “On Consumption-Indexed Public Pension Plans”. In *Financial Aspects of the U.S. Pension System*, edited by Zvi Bodie and John B. Shover, University of Chicago Press, 1983. (Chapter 18 in *Continuous-Time Finance*, reprinted in the *Foundations of Pension Finance*, Volume I, Zvi Bodie and E. Philip Davids, eds. Edward Elger, 2000.)

purchase the same percentage of per capita consumption). Individuals' preferences are likely to depend on their age; senior citizens (those over 65 years in age) are more likely to be satisfied with being able to purchase the same basket of goods, whilst other adults are more likely to want to purchase better-quality and newly-created products as they surface. From a public policy perspective, maintaining a constant relative standard-of-living is a superior alternative, given that it would in all likelihood also guarantee a stable absolute standard of living. Further, pension contributions are made by the working-age population, which is likely to focus on the relative standard-of-living.

Maintaining a constant standard-of-living on a relative basis could be attempted through inflation-indexed, or better still, consumption-indexed life annuities. Merton (1983) argues that consumption indexing is desirable, sustainable, macro-consistent, and allows for citizens' risk-sharing in the real economy as measured by aggregate consumption. His main argument in favor of consumption-indexing is that inflation-adjustment would not maintain the relative standard-of-living. Indeed, despite all the improvements over the last thirty years in inflation measurement methodology, inflation-indexing still does not guarantee a constant relative standard-of-living.

Issuance of consumption-linked life annuities requires an adequate measurement of aggregate per capita consumption. National consumption can be calculated either by using VAT/GST receipts ("macro approach") or by calculating each individual's consumption and aggregating them ("micro approach"). The macro approach is more direct and easy to implement. All businesses have a financial benefit in declaring VAT charges on their finished products to be able to claim back VAT paid on intermediary products; such that a government should get a good picture of the ultimate VAT/GST paid by consumers. However, in the specific case of Singapore, the macro approach might not be appropriate as a large portion of domestic consumption is made by resident foreigners and tourists who are not permanent residents. Singapore is a small-island state with one of the highest percentages of resident foreigners in the world, and with very large tourism activity. Singaporeans and Permanent Residents ("PRs") represent less than 75% of the island's total residential population, while tourists' purchases represent roughly 15% of the domestic consumption.⁴ Singapore publishes separate GDP statistics for resident foreigners and Singaporeans; however the ability to measure precisely the evolution of citizens' and PRs' consumption through economy-wide data is questionable.

The alternative approach is to calculate the consumption of each Singaporean and PR individually and then calculate the average per capita consumption. The micro approach would be more cumbersome to implement than aggregating VAT/GST receipts, yet it is not an insurmountable problem. Merton (1983)

⁴ In 2010, Singapore GDP reached SGD 303.65B with consumption representing roughly 40% of that amount (i.e., consumption equals SGD 121B), and tourist receipts represented SGD 18B. As a consequence, tourism represented around 15% of 2010 domestic consumption. (Sources: Statistics Singapore, Singapore Tourism Board, www.economywatch.com)

actually suggests calculating each person's consumption as the residual in a cash-flow analysis - in his proposed pension system, contributions are based on each individual's consumption and as such it is necessary to measure individual consumption. Practically speaking, individual consumption could be calculated as the difference between the annual flow of post-tax income and savings. In the case of Singapore, the micro approach would certainly yield better results.

2) Hybrid Approach: co-existence of Public and Private Pension Systems

Most countries are experiencing simultaneously an increase of life expectancy and a declining fertility rate. The ageing of the population continues to significantly reduce the support ratio (i.e., the ratio of active population to the number of retirees). As such, today, national pensions systems and their necessary adjustments are one of the most hotly-debated public policy topics amongst both governments and populations. In countries with a pay-as-you-go public pension system, in which current retirees' pensions are financed by current workers, there are question marks about the governments' ability to continue delivering the promised pension benefits without increasing the national debt to unsustainable levels. In countries with private defined-contribution plans, there are concerns about the future uncertain value of each person's retirement fund, and their ability to convert those accumulated funds into a reasonable pension income for life at the time of retirement. Given the economic and political complexity of implementing radical adjustments to an existing pension system, most adjustments in practice are made at the margin, e.g., increasing the retirement age, whilst the fundamental structure of the pension system (public and/or private) is seldom debated. In this section, we suggest that the state should aim to guarantee all citizens a basic living pension as described in Section 1, and that any additional pension savings and retirement income should be left to the private sector to manage.

A person's well-being is affected by the living conditions of people around them. More specifically, people feel less happy if they see or know that people are suffering around them. These externalities explain why most countries have developed social welfare nets to help the most deprived. However, it would be complex and costly for governments to support entire populations of resource-deprived retired senior citizens. Hence, there is both a need and a benefit for the state to ensure that their people save enough during their working lives such that they are all entitled to receive a basic living pension throughout their retirement years. As pointed out by Merton (1983), these externalities, and the possibility of private market failure, reduce the likelihood of a pure free-market private pension system guaranteeing a basic living pension.

As stated, the main objective of the public pension system should be to guarantee a minimum standard-of-living for all retired citizens. We have outlined in the previous section that this can be achieved through consumption-indexed life annuities. Two additional objectives of the public pension system

should be self-funding, i.e., public pension distributions are paid from public pension contributions, and self-reliance, i.e., each citizen's pension distributions are funded from his own past pension contributions. Additionally, consumption-linked (or at a minimum, inflation-linked) life annuities should be the compulsory retirement investment product within the public pension system. Laissez-faire economists and governments would probably oppose any such compulsory system with no individual choice on offer; however coverage and costs make the "compulsory, no-optionality" public retirement system a superior proposal:

- As mentioned earlier, the public pension system's role is to provide a minimum income for all senior citizens so that they can support themselves. Any retiree unable to support themselves will depend on the financial assistance of family or, if unable or unwilling, the state. As such, it is optimal for the state to make sure that people save for retirement, and to ensure that these savings are sufficient to support the retired as long as they live. The best way to ensure the latter is to convert all public pension contributions immediately into consumption-indexed life annuities payable from a pre-specified age. Offering savings flexibility would lead to additional costs for the state as free-riders will over-consume during their working lives and/or take too much risk with their pension savings and thus look to the state for support during their later years. To this point, note that the value of 1\$ today in terms of a future annuity is high when interest rates are low (often the case during a recession), which could encourage people to save, and hence not consume, when the economy is weak – hardly a desired outcome. Compulsory contributions and a unique investment product address the free-rider conundrum.
- The second advantage of making life annuities the compulsory retirement investment product is that it removes any adverse selection cost. Transforming cash into a life annuity is a great investment for people who will live much longer than their age group and a bad investment for those who will live much shorter than their age group. As such, there is a strong incentive for people with weak health not to subscribe to life annuities and if this was an option, the overall population mortality tables would then not be applicable to the calculation of the life annuity conversion factor. Adverse selection would both result in lower annuities for each dollar contributed and increase the uncertainty risk for the provider of the life annuities, i.e., the state.

We have just argued that the public pension income during the distribution phase should be a consumption-indexed life annuity, but what should the target level for this state pension be? We further argued that the public pension objective is to provide a basic pension income allowing all citizens to live decently and out of poverty through their old age. Each country has its own specific definition of poverty; nevertheless most countries define the relative poverty line as people or households with income below a given-percentage of the median income. Singapore has no official poverty line; however the relative poverty level is generally defined as half of the median per capita household income. Disregarding real estate and health care expenditure, which will be covered in Section 4, one would

expect senior citizens to consume less than working-age citizens mostly because the former no longer have children to support. As a consequence, a life annuity paying 50% of the per capita consumption should constitute an acceptable basic state pension. It would be tempting for a government to target a higher percentage of per capita consumption than 50%; however the stated objectives of having a self-funded state pension system with individual self-reliance mean that a higher target might not be achievable without requiring unrealistically high pension contributions for a non-negligible part of the population. The lowest-paid workers might already be unable to contribute enough during their working life to achieve the 50% target; possible solutions to this issue could involve government transfers and benefits, and/or increasing the retirement age for people unable to contribute enough.

The second key variable affecting pension income is the age from which the life annuity pension payment is received; the later the starting date, the longer the possible contribution period, the shorter the life expectancy, the “cheaper” the life annuity. Singapore’s retirement age will be raised to 65 from January 2012 to take into account increased life expectancy. The simplest solution would be to start paying state pension life annuity payments to individuals when they reach 65, i.e., when they retire. However lowly-paid workers might be unable to contribute enough to their pensions to be able to receive the full state pension from 65, and as such it seems beneficial to allow these lowly-paid workers to begin receiving their life annuity payments from 70, rather than 65. The 70-year annuity start date with lower working-life contributions should not be available to average and above-average earners, so as to remove the risk of citizens choosing to contribute less to their pensions during their working-life, and then being unable or unwilling to work between the age of 65 to 70.

Note that the basic compulsory public pension system described above solely provides a decent minimum income for retirees and, as such, anyone should be entitled and encouraged to save more during their working life in order to receive a higher retirement income. It is likely that above-average earners will be willing to save more for retirement during their working life so as not to rely purely on the limited public pension and to avoid a major drop in their standard-of-living during retirement. Any such additional savings should be entirely discretionary, and the resulting investments should be managed on a purely commercial basis by the private sector. This would send a clear sign that the state should only interfere with the private sector only when it is absolutely necessary, i.e., when significant externalities would not be accounted for by a pure free-market system. Furthermore, the involvement of the private sector should result in more competition and a larger choice of products offered to savers and future retirees, and allow for the tailoring of future retirement distributions to each individual’s desire. People would have the choice between subscribing to additional consumption-linked annuities, investing the contributions in marketable securities (equities, fixed income, etc.) or any other financial or structured products. There should be no government guarantees on all the pension obligations due by the private sector (whether life annuities or not) and each individual will have to consider the risks associated with these investments, including the long-term credit-worthiness of their private pension

provider. In parallel, private pension providers should be closely regulated to ensure prudent financial management and truth-in-labeling when marketing investment products for retirees. In addition to enacting regulations, the government can also have a strong influence on the private pension system through tax incentives, which encourage additional retirement savings and/or investments in low-risk, indexed life annuities.

Merton (1983) suggests a public pension system in which everyone contributes the same percentage of his actual consumption to his pension. This creates three fundamental differences with our proposal: firstly, a more dominant role for the state in the pension system with higher public pension contributions and distributions for well-off people reducing the need for additional pension savings through a private pension system; secondly, the aggregate population longevity tables are not appropriate given that more life annuities are purchased by wealthy people who might have a longer life expectancy; and finally, each person's pension contributions are based on his/her own level of consumption, such that there is an obligation to calculate individual consumption accurately.

3) Public Pension Retirement Income and Manufacturing Consumption-Indexed Returns

In the two previous sections, we have shown that, through the public pension system, a government should pay a consumption-indexed life annuity to each citizen based on their past contributions and earned annuity credits. In this capacity, the government acts as a financial intermediary: it receives cash today and promises indexed annuity payments in the distant future, and for an uncertain period of time. How should the government approach these significant, distant and uncertain financial obligations?

One possible approach is the "pay-as-you-go" system where all pensions contributions are allocated to the government's general budget and pensions obligations are only assumed when they become due – financing them through the general budget as with any other expense. There are, however, significant problems with this approach:

- Lack of accountability: the government receives revenues now and pays pensions later. This increases the chances of the government mismanaging its resources and over-spending during the early or good years.
- Significant demographic risk: a pay-as-you-go system can only achieve self-funding through inter-generational transfers and, as such, is highly dependent on the evolution of the support ratio.
- No market-based pricing check: without a specific funding program for future annuity liabilities, there would be no market-based determination of what one dollar today is worth in terms of a consumption-indexed life annuity starting in decades and it would not be possible to ensure the objective of individual self-reliance. Furthermore, the absence of external market-checks

increases the risk of political interference in the determination of the annuity conversion factors.

A preferable approach would be to create a self-funded, government-guaranteed public pension fund, and create a financial environment that allows the fund to reduce as much as possible the uncertainties affecting its asset-liability management.

First, to improve the accountability of the public pension system, the government should establish an independent legal entity in charge of receiving pension contributions and paying annuities to pensioners. The public pension fund would be responsible for setting (on a purely commercial basis) the annuity conversion factors applicable and updating them whenever needed; this would reduce potential political interference. The obligations of this public pension fund, i.e., the pension annuities payments, would be formally guaranteed by the government; this would remove any potential “credit” concerns from contributors and assure them that their basic pension is guaranteed by the state. In exchange for its guarantee, the government would be granted some limited oversight over the public pension fund, although this oversight should be clearly defined to limit political interference. Another way to increase accountability and reduce political interference risks would be to require the public pension fund to publish a detailed annual report listing its future obligations, its current investments, the mortality tables used and details of the annuity conversion factors’ calculations.

Second, the government should issue consumption-indexed zero-coupon bonds so that the public pension fund, or for that matter, private plan sponsors also offering consumption-linked investment products, can purchase assets which closely match their liabilities. Given that the objective of the public pension fund is to minimize its asset/liability mismatch and that all its liabilities are consumption-indexed life annuities, the public pension fund should invest exclusively in consumption-indexed bonds. Without consumption-indexed bonds, it would be very difficult for the public pension fund to price the annuity conversion factors as there would be no comparisons, and distant future aggregate consumption levels are very difficult to predict. This pricing uncertainty would increase the risk that the public fund promises too much and would also increase the possibility of political interference in the calculation of the applicable conversion factor, e.g., where voters criticize the government for being too conservative in its calculations and giving savers a bad deal. Furthermore, as Bodie, Cherian and Chua (2011) point out, government is the natural institution to provide inflation- or consumption-linked benefits because tax revenues, both income and sales taxes, are automatically indexed to inflation and consumption.

On the private sector side, there are two significant problems with relying on corporate consumption-linked bonds to finance public pension life annuities. First, most corporate issuers display a limited link between their revenues and the overall consumption of the population. Second, a currently low-risk

corporate issuer might not remain low-risk over the very long horizon needed; median maturity may be between 30 and 40 years, with the longest maturities up to 70 to 80 years.

Skeptics may question the ability of government to issue consumption-indexed bonds. Several OECD countries have been issuing inflation-adjusted bonds for many years (e.g., US, Japan, France, Sweden, etc.) but none have experimented with consumption-linked bonds. Would it be more practical to rely on inflation-adjusted bonds rather than consumption-indexed bonds? First, it is important to reiterate that consumption-indexed bonds are superior in tracking the standard-of-living on a relative basis. Second, the fact that they do not exist does not mean that they could not be issued. In order to achieve the price discovery process for consumption-indexed annuities, which is a key argument in favor of issuing consumption-indexed bonds in the first place, it is necessary for numerous private investors and the public pension plan sponsor to subscribe to these bonds. It is possible that consumption-indexed bonds will initially be less attractive to private investors as these bonds would be neither nominal nor real fixed-income securities; rather they are “dividend” securities offering long exposures in the per capita economic growth of a country. One possibility to stimulate private demand is for governments to provide tax incentives to individuals who opt to invest additional retirement savings in consumption-linked bonds, as is done in the US for Savings Bonds, thus creating demand from financial institutions who distribute these bonds to their retail clients. Note that it is not necessary to restrict tax incentives to life annuities as the objective is to encourage demand from private financial intermediaries for consumption-indexed bonds, and not to force them to sell longevity protection. At a macro level, encouraging retirement savings above the basic public pension level should help the economy both by increasing the savings rate, and by limiting the drop in the standard of living during retirement.

Assuming that consumption-indexed government bonds are available at all maturities, e.g. up to eighty years, the only remaining risks faced by the public pension fund are the population’s longevity risk and the government’s credit risk. The current turmoil in peripheral European sovereign debt shows that the long-assumed risk-free status of most OECD sovereign bonds might have been an overly optimistic assumption. Nevertheless, except in a few specific cases, OECD government debt is still considered very low risk and safer than corporate bonds, especially over a very long horizon. Furthermore, national government sovereign risk will always be present in any pension system.⁵

The population’s longevity risk is much more critical. It represents the risk that people live longer than expected. For the public pension fund, this might mean that investments purchased with pension contributions are not sufficient to pay the promised life annuities. As discussed earlier, the advantages of automatic investments of compulsory public pension contributions in life annuities are that the

⁵ Even in a scenario where all pension contributions have been invested in foreign sovereign bonds, a financially overstretched government could increase taxes on life annuities pension payments. As such, pension income is exposed to local sovereign risk, whether or not the public pension fund invests in government bonds.

longevity risk is spread across the entire population, which is expected to be less volatile than over smaller sub-sets of the population, and that there is no adverse selection. Although it might be theoretically possible for the public pension fund to purchase longevity risk insurance from insurance companies or banks, the benefits would be limited because longevity risk would be replaced by counterparty risk, and a non-negligible premium would have to be paid. As such, and considering the government-guarantee, it is better for the public pension fund to assume the longevity risk itself. Further and as discussed in Section 4, as long as people are working it may be possible to adjust current contributions to the public pension fund to cover for unexpected changes in longevity expectations of that person's age group. Therefore, the only longevity risk truly remaining for a given age cohort arises when longevity expectations at retirement underestimate the cohort's realized longevity.

In summary, we have argued in this section that the public pension system should be operated through a self-funded, independent public pension fund whose obligations are guaranteed by the state, and that the government should issue consumption-indexed bonds of all horizons for the public pension fund to invest in.

4) Working-Life Contributions to the Public Pension Plan

In Section 2, we argued that it was optimal for contributions to the public pension plan to be compulsory and fully invested in consumption-indexed life annuities, which would pay 50% of the average per capita consumption from age 65 (or from age 70 for the lowest-paid workers). In this section, we will first discuss necessary public pension contributions, and the influence of the annuity conversion factor. Finally, we will cover the specific cases of real estate and health care expenditures.

Our proposal is that all public pension contributions made during one's working life are immediately converted into a consumption-indexed life annuity starting from a known date. The annuity conversion factor (from cash today to future life annuity) is therefore the key variable which will influence how much has to be saved to achieve the 50% of per capita consumption life annuity objective. In the case of Singapore, this would work out to about S\$12,000 per annum based on 2010 figures.

If consumption-indexed government bonds are widely available at all maturities, as discussed earlier, the only remaining risk for the state pension fund is the population's longevity risk. As an illustration, if we assume that an individual's date of death was known, there would be no pricing uncertainty for its annuity conversion factor and each dollar contributed could be used to purchase at current prices an identical nominal amount of consumption-indexed government zero-coupon bonds maturing in each year from the beginning of the life annuity payment period until the known year of death. For all citizens, the longevity assumptions used by the public pension fund will be based on similar inputs: population expected mortality tables, gender, date of birth, and start of distribution period. Two individuals of the same gender and the same age will be subject to the same annuity conversion factor;

and, since they have the same target pension annuity, their required public pension contributions will be identical, unless one of them is a very-low earner and/or has spent time unemployed. This is different from Merton (1983) who suggests pension contributions proportional to each person's actual consumption.

On top of the longevity risk, savers are faced with significant real interest rate risk; indeed, the price of consumption-indexed long-term government bonds will be significantly affected by real interest rates: the higher the real interest rates, the lower the present value of future payments and the lower the conversion rate.

In order to achieve the targeted life annuity during the distribution period without jeopardizing the objectives of self-funding and self-reliance, the level of workers' pension contributions has to adjust in line with changes in longevity tables and government bonds yields. Furthermore, periods of unemployment could result in pension underfunding and should be anticipated. However, large fluctuations in required pension contributions would create unbearable disposable income uncertainties for people with below-average revenues. As such, the public pension system should aim at achieving a double objective: self-funding and self-reliance on one side, and reasonable and stable contributions on the other. We describe below three complimentary features which help achieve this double-objective.

First, at each individual's level, instead of targeting a fully-funded public pension at retirement age (i.e., where past contributions have purchased the targeted life annuity of 50% of per capita consumption), it would be better to aim to reach a fully-funded pension a few years earlier (e.g., five years before retirement). In this way there would be room to absorb negative events like an increase in real interest rates and/or short periods of unemployment, without affecting the contribution levels. Any necessary adjustments for these events would thus be made by extending the contribution period over the original date planned. A continuation of an existing contribution in the distant future does not affect today's disposable income and should be almost pain-free for contributors. The contribution period extension would be capped at the beginning of the life annuity payments.

Second, the longevity tables and the methodology used to derive them should be transparent, public and be computed as scientifically as possible without trying to be conservative or generous. If assumed life expectancy is too high, citizens would receive unfairly low life annuities for every dollar they contribute. Conversely, if assumed life expectancy is too low, the public pension plan would have a funding gap, which would have to be filled later on. Any increases in the expected longevity table would have two effects: firstly, an increase in future contributions to purchase the remaining life annuities and, secondly, a savings shortfall for the public pension fund (as life annuity conversion factors used in the past were too generous). The first necessary adjustment (i.e., increase in future necessary contributions) could be made by increasing the contribution period. For the second effect, the public pension fund has

to assume the longevity risk given that life annuities have already been purchased. However, a fair mechanism to reduce the longevity risk faced by the public pension fund would be to cover - on an individual basis - any existing pension fund savings shortfall by using any remaining contribution period buffer available when the individual achieves a fully-funded pension. The public pension fund would have invested all contributions in consumption-indexed zero-coupon government bonds across all necessary maturities to minimize the asset-liability mismatch, so assuming that it keeps track of what bonds were purchased with each individual's contribution, it is straightforward to calculate each individual's savings shortfall or surplus in terms of "missing" or "excess" bonds.

Finally, long-term moving-average consumption-indexed zero-coupon government bond prices should be used to establish the level of contributions necessary through working-life to achieve the targeted life annuity. Indeed, using the current annuity conversion factors, which are based on the current prices of consumption-linked zero-coupon government bonds, results in constant and potentially significant changes to the required contribution level. For example, in periods of high real interest rates, the future value of current contributions would be small and required pension contributions very high. Note that the actual conversion of cash contributions into consumption-linked life annuities is still done at current market price using the current prices of consumption-indexed zero-coupon government bonds. The long-term moving average prices are used only to assess the "funding situation" of each citizen's state pension and to determine if adjustments to the contribution period or future contribution levels are necessary. Over the long-term the difference between the two calculations should not be significant as discount rates should oscillate around their long-term moving average. Further, in practice, each year and for each individual, the difference between the previously "anticipated" annuity conversion factor and the realized conversion factor for the current year will result in the state pension being slightly over- or under-funded. As discussed above, the necessary adjustment can be made by adjusting the contribution period, unless the final contribution date is already at the cap.

The smoothing mechanisms and initial contribution period buffer described above do not guarantee that real public pension contributions will never have to be increased. Once the contribution period has been extended up to the life annuity distributions start date because of an increase in life expectancy, increase in discount factor and/or unemployment, the only remaining adjustment factor is to increase the contribution level. However, contribution increases should occur rarely and would be distributed over the remaining working life.

Impact of Real-Estate Ownership on Pension Contributions

During the pension distribution period, senior citizens who own their home without a mortgage need less income than those who rent their flat or pay a mortgage. Given that housing costs could represent a

significant portion of senior citizens expenditures, the public pension contributions and distributions should take into account the real estate ownership status of each person.

One possible solution would be to have a separate target “rent” pension life annuity paid for by specific contributions, which would work very similarly to the standard “basic expenditures” public pension discussed up to now except for a few specificities. Contributions would not be required for people who own their home with no mortgage. Partial contributions would be compulsory for people who own their home but have a mortgage; the contribution level would depend on the actual net percentage ownership in the house. Point-in time adjustments would be needed when someone purchases or sells his property: a) for purchases with deposit, the net percentage ownership in the property could be used to reduce the target “rent” pension annuity and necessary pension contributions, b) for sale without subsequent purchase, the net sale proceeds should be used first to buy the necessary “rent” pension annuity, which had not been contributed for previously.

In some countries, e.g., the US and UK, senior citizens who own their property without a mortgage can enter into a reverse mortgage in order to obtain supplemental income during their retirement. A reverse mortgage basically works as a partial equity release. It can be either a one-off payment or a series of regular payments. The owner does not have to make any payment until he dies or leaves the house, and all amounts lent to him, both principal and interest, are secured against the property. How could reverse mortgages affect pension savings and income? Reverse mortgages can be a very effective tool to supplement the basic public pension life annuity program. However, there are so many uncertainties over the terms of reverse mortgages in the distant future, that it does not seem possible to reduce the compulsory “basic expenditures” public pension contributions; only the exemption from “rent” pension contributions is warranted.

Impact of Health Care Costs on Pension Contributions & Distributions

Health care needs during retirement vary a great deal between individuals, and even person-specific health care costs will not be regular over the retirement years. Health care costs are fundamentally different from basic and housing expenditures, which tend to be fairly stable (or at least affect all citizens in the same way) and broadly follow the country’s economic growth, and which can be paid for with a life annuity pension. As such, an annuity payment is not an appropriate way to fund health care needs during retirement. Furthermore, a lump sum health care saving would not be appropriate either; indeed a lump sum saving would solve the issue of health care cost variability over the years for a given person, but would not address the problem of health care costs’ extreme variability between individuals. There is no cap to potential health care needs, so whatever the lump sum saving allocated, some individuals will run out of funds to pay for their health care needs. This means that strict individual self-reliance for health care needs is not desirable. Overall health care needs are too volatile and

unpredictable to be financed individually through the public pension system; however universal basic health care coverage would create positive externalities for a society, akin to the universal basic living pension coverage discussed in this article. The specificities of health care costs are generally taken into account by government via public health insurance, government provided health care or a combination of the two.

One possible approach would be for the government to pool the health care “burden” through a universal health care public insurance/coverage. More specifically, health care services to retirees would be provided or paid for by the government, and active citizens would pay for their current and future health care expenditures through compulsory health care contribution during their working life. The government could try to create a system of incentives such that people try to minimize their health care expenditures. Note that the Singapore health care system broadly follows the key principles described above through its Medisave and MediShield programs, Medifund assistance, and the presence of numerous public hospitals.

Conclusion:

In this article, we have focused on the state’s role and intervention in the pension system; more specifically we have discussed what should be its objectives and how to achieve them.

Society benefits if all senior citizens receive a basic living pension, hence it is beneficial for governments to create a compulsory public pension system. A satisfactory basic living public pension distribution would be a consumption-indexed life annuity which would provide each retiree with a constant percentage (of say 50%) of the national per capita consumption. Any additional pension savings and supplemental pension distributions would be optional and managed by the private sector.

To achieve universal coverage, decent pensions and limit public funding to a minimum, choice has to be sacrificed; public pension contributions should be compulsory and their level determined automatically and transparently by the public pension system. A self-funded public pension fund should receive all public pension contributions and pay all public pension distributions; and each individual should be self-reliant. Contributions should be immediately used to purchase consumption-linked life annuities. Furthermore, individuals’ contributions have to be reasonable and steady such that disposable income is sufficient and stable for all workers. Several complementary mechanisms could be used to smooth the required contribution stream.

To reduce the financial uncertainties faced by the public pension fund and improve the consumption-indexed annuity price discovery process, the government should issue consumption-linked bonds at all maturities and sell them both to the private sector and to the public pension fund. This would leave the public pension fund exposed only to population-level longevity risk.

Housing expenditures should be included in the public pension system but with dedicated contributions and life annuities such that the home ownership status can be taken into account. Conversely, health care needs are too volatile and unpredictable to be financed individually through the public pension system; instead the state should raise compulsory health care contributions from active citizens and provide basic health care insurance or coverage to all citizens.