

Case study: Sensitivity of social security costs to proportions employed and the distribution of income across the population in a small African country

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ABSTRACT

A simple model is used to project the long-term costs of a basic pension in a small African country with a highly-unequal income distribution and high unemployment. The cost varies very significantly according to the future economic development of the country, particularly to changes in the income distribution and employment. Meeting the social need of poverty alleviation may conflict with sustainability.

KEYWORDS

Basic pension; highly-unequal incomes; sustainability

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1. INTRODUCTION

I developed a very simple model to test alternative designs for social security in a small sub-Saharan African country. This work highlighted the difficulties of providing social security in countries where there are very high levels of unemployment and of employment at low income levels in the informal sector. The affordability of social security may depend upon future improvements in living standards and economic growth. Alternatively, levels of social security benefit must deteriorate in inflation adjusted terms to keep the system affordable. This could mean that the system's social objectives will not be achieved.

One of the great problems when dealing with lesser-developed countries is the paucity of economic and demographic data, and inconsistencies in that data. This is particularly true of earnings enjoyed in the informal sector. There is, as a result, considerable potential to argue over the data. The picture that emerges is, however, consistent: incomes are very unequal with a large proportion of the population earning little and a relatively high proportion of the total earnings in the population coming from a small group of high earners; unemployment is high; a considerable proportion of the potential workforce either works in the informal sector or in subsistence agriculture; and there is considerable movement between the formal and informal or agricultural sectors.

I have therefore set this paper in a mythical country for which the data is set out in Appendix I. Please note that although I have used a dollar sign to indicate the currency this is simply a convenient symbol to indicate currency and does not indicate the currency of a particular country.

The benefits modelled for social security are my own construct and do not represent either the advice given to officials in any particular country or wishes expressed by any stakeholder group in any country.

2. MODEL

The model takes the population breakdown in 2008 as set out in Appendix 2 in quinquennial age bands, and projects this forward, 5 years at a time. All members of an age band are assumed to be aged at the midpoint of the band.

The number of male children aged 0 to 4 at projection date t was taken as

$$\frac{C_{2008}^m}{F_{2008}} \times R_t \times F_t$$

and the number of female children aged 0 to 4 at projection date t was taken as

$$\frac{C_{2008}^f}{F_{2008}} \times R_t \times F_t$$

where

C_{2008}^m = Number of male children aged 0 to 4 in 2008

C_{2008}^f = Number of female children aged 0 to 4 in 2008

F_{2008} = Number of women aged between 15 and 44 in 2008

F_t = Number of women aged between 15 and 44 at date t

R_t = Birth rate adjustment factor for year t (see Appendix 2).

3. BENEFITS MODELLED

3.1 Background on the country

The country has had a social old age grant for many years. This is paid to all residents over the age of 60. Its current level is \$550 per month. The grant is funded on a Pay as You Go basis from general tax revenue. The level is reviewed periodically, but there is no commitment to link the grant to inflation as the amount depends upon what Government can afford from tax revenue.

Unemployment rates are thought to be of the order of 35%.

The income distribution in the population is set out in Appendix 1. The proportion of the population that is unemployed is similar to the proportion of people who earn the lowest 25% by income level. As some money may be earned from informal employment, I have assumed that it is this lowest income group that is unemployed or employed partially in the informal sector.

The remaining groups of people by income level are assumed to have employment and to have the potential to contribute to social security.

It is known that many people move between the formal sector (defined as working for a registered employer who deducts income tax from their wages on a Pay as You Earn basis) and the informal sector where they are “self-employed” and will not be registered for tax. Self-employed professionals, and sole proprietor businesses which employ people from outside the proprietor’s family, are regarded as falling within the formal sector.

While social security contributions can be enforced for employers who are remitting tax to the revenue authorities, and for private individuals who pay tax, this cannot be done for people who do not pay tax. Most, if not all, people who are employed in the informal sector do not pay tax. It is therefore impractical to force such people to make social security contributions even if they are earning sufficient to make such contributions. It is likely that the primary retirement benefit that the unemployed and those employed in the informal sector receive will be the social old age grant.

The pattern of employment suggests that many people retire with periods of formal sector and informal sector employment, i.e. a record of social security contributions with a number of breaks in service. There is no certainty that a person is employed in the formal sector on reaching age 60.

The government of this mythical country has indicated to the benefit designer that

- the social security benefit should replace the old age grant for members of the “to be designed” National Pension Fund
- the main earnings-related benefit to be provided from the National Pension Fund should be funded.

3.2 The earnings-related portion of the social security benefit

The government has indicated that it wishes a replacement ratio on retirement at age 60 to be of the order of 45% for a member after a career-long contribution history;

that is, the income in the first year after retirement from the National Pension Fund should be at least 45% of the income earned in the year before retirement after career-long contribution, taken to be a period of at least 30 years. The income received by a contributor should rise with inflation after retirement.

The vast majority of contributors to the National Pension Fund will not be financially sophisticated. Most are currently without any experience of financial services products. Most do not have bank accounts. Most have low earnings. There will be limited understanding and tolerance for investment risks generally.

The country is small, with limited investment opportunities locally. Much of the investment is expected to be made outside of the country. Inside the country, many of the investment opportunities will be in the form of private equity and loans to unlisted entities because of the paucity of listed entities.

If the country experience is similar to that in South Africa, the annuity industry is geared to provide annuities to middle- to high-income savers, and the annuity rates may not favour the general population whose life expectancy may be shorter.

If an individual or collective defined contribution structure is selected, the members will be exposed to market volatility and currency risks although the smoothing possible with collective defined contribution may mitigate this to some extent.

If a defined benefit structure is selected, the administrators will have to deal with many people with breaks in contribution history and possibly with contributions at different rates as people strive to make up periods of under- or no contributions.

Taking these issues together, the benefit design for the funded earnings portion of the benefit that seemed best able to deal with these challenges was a “cash balance plan with guaranteed conversion terms”: i.e. a defined contribution fund to which members and/or employers make contributions, investment return is added at a guaranteed rate in relation to inflation (such as “CPI plus 4%”), and the terms at which the retirement capital is converted into income are guaranteed for some years ahead although there is the capacity to change these terms as longevity changes.

The Fund will invest the assets with the intention of generating inflation plus 4% over rolling periods of three years, with Government providing a guarantee of this over any shorter period. Because investment return is expected to attain this level, such guarantee is not expected in the medium term to cost Government anything. Government makes a loan to the fund in years when the return is below this level and cannot be made good by past returns held back, and the loan is repaid once returns improve. If, however, investment returns drop for an extended period below the level of inflation plus 4% the guarantee from Government becomes real and the rate of increase and rate of contribution may have to be revisited.

The second risk to Government comes with the guaranteed conversion terms on retirement. The guarantee here is one that will apply only to members who retire within, say, the next three to five years so, for example, the conversion terms can be changed for members who will be retiring in, say, three to five years time. The critical feature is that members have certainty as to their pension benefit in the years

shortly before retirement. The conversion terms will be regularly reviewed. This risk to Government implicit in the investment return and conversion terms guarantees is not, however, any more onerous than the guarantee that Government would provide if it underwrites a defined benefit plan to achieve the same objective.

In order to achieve the 45% replacement ratio, a contribution rate of approximately 11% was selected. This should deliver the 45% replacement ratio at age 60 after 30 years of contribution at an investment return of CPI plus 4%.

Broken periods of service will be accommodated if the scheme is operated on a “contribution paid” basis; i.e. there is no attempt to “pull” the correct contribution from people’s earnings from month to month, but the administrator accepts whatever is paid and credits the member’s individual account. Where a person pays income tax, the income tax authority will apply the rule as to whether these contributions are taxable, or not. (There might, for example, be a ceiling on the total tax deductible contribution in a tax year.)

Once this was determined there was then a question as to how to integrate the funded earnings-related portion with the old age grant.

3.3 Some of the challenges in introducing a social security benefit

The old age grant meets the replacement ratio criterion for people earning less than \$1222 per month. If people earning less than \$1222 per month are going to get the old age grant anyway, it seems reasonable to exclude them from having to make social security contributions.

It will be seen as unfair if a person earning slightly more than \$1222 per month has to make social security contributions, and gets little more than the old age grant that he will receive if he makes no such contributions.

In trying to introduce a social security benefit in such an environment there are at least two major challenges:

- (a) how to integrate the social old age grant with the funded earnings-related portion in a way that makes social security seem fair to participants. Particularly for those earning less, or slightly more, than the level at which the targeted replacement ratio is derived from the social old age grant, it may be regarded as unfair if a person does not receive the old age grant before deriving any benefit from the accumulation of their social security contributions.
- (b) how to encourage people, who are earning enough in the informal sector to afford some retirement savings, to make those savings without their feeling that their savings may be absorbed into funding a social old age grant that they will receive anyway.

Converting the old age grant into a basic pension, which is financed by all participants as a (hopefully modest) Pay as You Go rate of social security contribution, was seen as way to address these challenges.

3.4 Suggested benefit design

This suggested to me the following benefit design, part of which has been incorporated into the model:

- (i) a basic pension at least equal to the social old age grant, financed on a Pay as You Go basis by a contribution, expressed as a percentage of earnings, by all those in formal employment. This contribution will be payable in addition to the contribution required for an earnings-related pension. The contribution will be identified as the social security element of the member's total contribution.
- (ii) an earnings related pension in addition to the basic pension, to which contributions must be made on income earned in excess of \$1222¹ per month. This will be structured as a "cash balance plan with guaranteed conversion terms" as described above. The 11% rate of contribution will generate a replacement ratio of 45% for members at age 60 on unisex annuity tables after 30 years' contribution assuming investment returns at inflation plus 4%. Mandatory contribution at this rate will be expected only for members in formal employment.

Such a benefit design will ensure that a person who earns a little more than \$1222 per month will get the basic pension plus an earnings-related benefit that reflects the contributions made towards the earnings-related benefit. Provided the social security contribution that funds the basic pension is modest, there will not be a perception of "unfairness" for members earning little more than the \$1222 per month.

Administratively the earnings-related pension will operate on a 'contribution paid' basis:

- A period of broken service will simply be a period during which no contributions are received. If additional contributions are paid, later, to make up for the service break, the additional contributions will simply be accepted.
- Employers will not be billed for contributions due, nor will there be any reconciliation at employer level as to whether the contributions paid are the amounts expected based on what employees earned. There may however be checking by the revenue authorities at individual and company level, when on-site inspections occur, that contributions are being paid as expected.
- Where an employer deducts contributions from employees and fails to pay these across to the fund, appropriate sanctions must be applied.

Irregular periods of employment in the formal sector, and any under-payment of contributions, will be reflected in lower benefits. This should be perceived as fair as the member will see a direct relationship between the contributions made during these periods of formal employment and the earnings-related benefit derived from those contributions.

¹ This was selected because it is the income on which the social old age grant achieves a 45% replacement ratio.

An individual account balance growing with investment returns and contributions will help a relatively unsophisticated people, unused to financial services, to appreciate the accumulation of “wealth”.

Contributions, after deduction of expenses and the contribution towards the social security element, will be invested. While the investments are expected to be able to generate a return in excess of inflation plus 4% per annum, the underwriting by government of such an investment return will remove the investment risk that most members are ill-equipped to manage. Members will see a return of inflation plus 4% credited to their accounts. Investment returns will be significantly more stable than they would be in a market value situation. There will also be no capital losses (as inflation is expected to be positive). If excess returns are generated beyond the level at which it would be prudent to hold them back for future subsidy of poor returns, it would be possible to distribute these by means of extraordinary bonuses to members' accounts or by reduction of expenses.

A single large scheme will benefit from economies of scale when sourcing investment management expertise and administration. The separation of the return declared from the return on the assets means that unlisted assets can be incorporated into the portfolio addressing some of the problems of limited listed investment availability.

The guaranteed conversion terms on retirement can be arranged to ensure that poor retirees do not subsidise higher income retirees, who may live longer.

3.5 The financing of the basic pension

One major problem of such a scheme is the financing of the basic pension and whether this is seen as fair by participants.

This is where the income distribution in the population becomes a major factor. Higher income earners, of whom there are relatively few, bear a substantial portion of the funding cost. This is what I set out to model.

It will be important in exploring the sensitivity of long-term costs to changes in income distribution to determine the long-term cost of the system, being either tax revenue to fund the social old age grant or social security contributions to fund the basic pension.

4. THE CASE STUDY

4.1 Objective

The objective of this case study is to explore the cost of the basic pension and its sensitivity to changes in income levels, employment, and birth rates.

As the cost of the basic pension will be expressed as a percentage of earnings, higher earning participants will pay much more in contributions than the value of the basic pension benefits that they receive. This is a cost of solidarity. If this cost is seen as too extreme to be politically acceptable, then the basic pension contribution could be expressed as a percentage of earnings up to a certain limit.

As income inequalities reduce, the impact of such cross subsidy is also expected

to reduce. The study must therefore explore costs if the population distribution across income levels remains as it does now, and then how these costs will change as the income distribution changes and birth rates change.

The basic pension and the old age grant are assumed to increase with price inflation.

4.2 The base case

4.2.1 *THE INCOME DISTRIBUTION AND EMPLOYMENT RATES REMAIN AS THEY ARE CURRENTLY AND THE MEDIUM BIRTH RATE TABLE IS USED*

The medium birth rate table is used (see Appendix 2).

	2018	2043	2068	2093
Cost of the old age grant ²	1,85%	1,27%	2,11%	2,67%
Cost of the basic pension ³	0,48%	2,42%	4,19%	5,31%
Total cost	2,33%	3,69%	6,30%	7,98%

The initial drop in the cost of the old age grant is caused by a declining number of people who are already retirees in receipt of the old age grant when the system starts. This cost then rises as more people retire from the lowest income band (below the level at which they make social security contributions).

The old age grant will continue to be financed by general tax revenues. The basic pension will be financed from contributions by those employed in the formal sector. The total of the costs of the old age grant and the basic pension will equal the cost of the old age grant as presently structured. (Everyone receives the old age grant regardless of other means.) This is relevant when considering fairness because it is the members in the social security system who will be paying taxes which will fund the old age grant to those who are unemployed or who earn little.

4.2.2 *IF THE “HIGH” BIRTH RATE TABLE IS USED AND THE INCOME DISTRIBUTION AND EMPLOYMENT LEVELS REMAIN THE SAME (SEE APPENDIX 2)*

	2018	2043	2068	2093
Cost of the old age grant	1,85%	1,27%	1,81%	1,95%
Cost of the basic pension	0,48%	2,39%	3,60%	3,87%
Total cost	2,33%	3,66%	5,41%	5,82%

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- 2 This is the old age grant payable to people who have not participated in the social security system because they had already retired before the system started, or they earned less than \$1222 per month. The cost is expressed as a percentage of the earnings of people contributing to the social security system (which will broadly approximate taxpayers).
- 3 This is the cost of the basic pension payable to former members of the social security system expressed as a percentage of their earnings.

Although not apparent from this table, the cost stabilises at approximately the 2093 level.

Costs drop in the long-term because the population is now bigger and there are more workers to support the costs of the system. This suggests that growth in the population is beneficial to the funding of the old age grant provided income levels remain the same across the (bigger) population.

Critical to this result, though, is that the distribution of incomes across the population remains the same, so, although fertility rates remain high, the growth in the economy keeps pace with the growth of the population.

4.3 “High” birth rates are combined with a constant absolute number in the population earning higher incomes (i.e. the growth in the population is absorbed into the lower earning categories only)

If I hold the absolute number of people in the two highest income brackets constant, and adjust the lower income brackets proportionately to absorb the growth in the population, costs alter as follows:

	2018	2043	2068	2093
Cost of the old age grant	1,85%	1,40%	2,12%	2,37%
Cost of the basic pension	0,48%	2,63%	4,14%	4,59%
Total cost	2,33%	4,03%	6,26%	6,96%

There is a significant increase in the long-term cost as compared to 4.2.2. above. This occurs because there are relatively fewer higher income people to absorb the increase in overall numbers of beneficiaries.

4.4 Unemployment and the informal sector reduce with the income distribution of those in employment unchanged

In order to show the possible impact of reducing numbers of workers who are unemployed or working in the informal sector, I reduced the proportion of the population in the bottom 25% by earnings level (which started at 33,5%) at a constant rate per year, until the proportion was 10%, and fixed it at that level thereafter. The increase in the proportion of the population at the higher income levels was adjusted proportionately upwards in each group so that the total remained 100%, retaining the relationship between the proportions of the population at the different earnings levels. Once the proportion of the population in the lowest earning category reached 10%, the distribution of income levels across the population was held constant.

The “medium” birth rate table was used.

Earnings level by proportion of the population	Starting proportion of the population	Ultimate proportion of the population falling into this earnings level once the lowest earning 25% of the population reaches 10% of the population
Up to 25%	33,5%	10,00%
25% to < 50%	27,4%	37,00%
50% to < 75%	21,7%	29,00%
75% to < 90%	11,1%	15,00%
90% to < 95%	3,2%	4,25%
95% to < 99%	2,2%	3,00%
99% to 100%	0,9%	1,25%

So, for example, if there is a 3% drop in the proportion of the population falling into the bottom 25% by earnings level, then the proportion of the population falling into the next 25% by earnings level will increase by $27,4\% / (1 - 33,5\%) \times 3\% = 1,24\%$, and so on.

	2018	2043	2068	2093
"Base case"				
Cost of the old age grant	1,85%	1,27%	2,11%	2,67%
Cost of the basic pension	0,48%	2,42%	4,19%	5,31%
Total cost	2,33%	3,69%	6,30%	7,98%
(a) There is a shift into formal employment of 0,5% of those in the lowest income group per year				
Cost of the old age grant	1,80%	1,00%	1,27%	1,23%
Cost of the basic pension	0,47%	2,20%	3,58%	4,30%
Total cost	2,27%	3,20%	4,85%	5,53%
(b) There is a shift into formal employment of 1% of those in the lowest income group per year				
Cost of the old age grant	1,75%	0,78%	0,73%	0,50%
Cost of the basic pension	0,46%	2,01%	3,13%	3,85%
Total cost	2,21%	2,79%	3,86%	4,35%
(c) There is a shift into formal employment of 3% of those in the lowest income group per year				
Cost of the old age grant	1,58%	0,32%	0,35%	0,44%
Cost of the basic pension	0,43%	1,69%	3,09%	3,92%
Total cost	2,01%	2,01%	3,44%	4,36% ⁴

Please note that these changes, and the ultimate distribution, are entirely arbitrary and are not based on any scientific evidence. Note that there is no change here in the level of earnings in each group of the population. The "base case" is repeated in the table for comparison purposes.

4 Comparing (b) and (c), the long term costs are identical: by 2093, the population has stabilised at the "ultimate proportion" shown in the table at the beginning of this section.

Reduction of unemployment and a move into the formal sector has almost halved the long-term cost of the old age grant and the basic pension.

4.5 Unemployment reduces, and income differentials reduce

If the same pattern of employment occurs, with a shift into the higher income brackets, as outlined in section 4.3 above, and there is also a significant shift in income levels in the different groups as outlined below, the cost of the basic pension will change profoundly.

Earnings level by proportion of the population	Average earnings in the group in 2013	Increase p.a. in real terms until 2068	Average earnings in the group in 2068 expressed in 2013 \$
Up to 25%	7 583	0,0%	7 583
25% to < 50%	15 217	3,5%	100 936
50% to <75%	31 203	3,5%	206 974
75% to < 90%	105 084	2,5%	408 648
90% to < 95%	227 583	2,0%	676 315
95% to < 99%	387 060	1,5%	877 830
99% to 100%	799 103	1,0%	1 381 269

Note that this is a completely arbitrary change: on a completely subjective basis, I adjusted earnings to the sort of differential that I expect in a developed economy.

	2018	2043	2068	2093
"Base case"				
Cost of the old age grant	1,85%	1,27%	2,11%	2,67%
Cost of the basic pension	0,48%	2,42%	4,19%	5,31%
Total cost	2,33%	3,69%	6,30%	7,98%
(a) There is a shift into formal employment of 0,5% of those in the lowest income group per year				
Cost of the old age grant	1,61%	0,50%	0,34%	0,33%
Cost of the basic pension	0,42%	1,10%	0,95%	1,15%
Total cost	2,03%	1,60%	1,29%	1,48%
(b) There is a shift into formal employment of 1% of those in the lowest income group per year				
Cost of the old age grant	1,57%	0,39%	0,19%	0,13%
Cost of the basic pension	0,42%	1,00%	0,83%	1,03%
Total cost	1,99%	1,39%	1,02%	1,16%
(c) There is a shift into formal employment of 3% of those in the lowest income group per year				
Cost of the old age grant	1,42%	0,16%	0,09%	0,12%
Cost of the basic pension	0,39%	0,85%	0,83%	1,05%
Total cost	1,81%	1,01%	0,92%	1,17%

The apparent anomaly in this table, with costs dropping to 2068 and then rising again, is a result of stopping the real increase in 2068. This is showing a dramatically different long-term cost at some 15% of the base case.

4.6 Unemployment and the proportion working in the informal sector increase

If the proportion of the population that are in the band with the lowest 25% of earnings increases, which would correspond to an increase in unemployment and workers operating in the informal sector, costs can be expected to increase.

In order to test this, I assumed that there would be a 0,5% increase in the proportion of the population in the lowest earnings band, with a corresponding decrease in the proportion of the population in the other earnings bands. I also assumed under these conditions that the birth rates would remain at the higher level:

Earnings level by proportion of the population	Proportion of the population in the group in 2013	Proportion of the population in the group in 2093
Up to 25%	33,5%	46,9%
25% to < 50%	27,4%	21,9%
50% to <75%	21,7%	17,3%
75% to < 90%	11,1%	8,9%
90% to < 95%	3,2%	2,5%
95% to < 99%	2,2%	1,8%
99% to 100%	0,9%	0,7%

	2018	2043	2068	2093
Cost of the old age grant	1,90%	1,62%	2,97%	4,10%
Cost of the basic pension	0,49%	2,66%	4,31%	5,03%
Total cost	2,39%	4,28%	7,28%	9,13%

This is directly comparable to the table in 4.2.2. The only difference is the proportion of the population in the different earnings bands. The long-term cost has now risen from 5,82% of earnings to 9,13%.

4.7 A limit is placed on earnings which are subject to the basic pension contribution

Projections suggest that a contribution of the order of 11% of earnings is required to achieve a 45% replacement ratio after 30 years of contribution, retiring at age 60, under the proposed cash balance plan with guaranteed conversion terms and a guaranteed rate of return of 4% more than price inflation.

The long-term cost of the basic pension (in income tax to support the old age grant and current payments to support the basic pension), without changing earnings distribution, may be of the order of 4% to 5% of earnings. The benefit that a worker will receive, in 2013 terms, is only \$550 per month. The \$550 can be expressed as a replacement ratio as follows:

Earnings level by proportion of the population	Average annual earnings in the group in 2013	Replacement ratio represented by \$550 per month
Up to 25%	7 583	87%
25% to < 50%	15 217	43%
50% to < 75%	31 203	21%
75% to < 90%	105 084	6%
90% to < 95%	227 583	3%
95% to < 99%	387 060	2%
99% to 100%	799 103	1%

The top 10% of workers by earnings levels receive significantly less in benefits than they will pay through social security contributions towards the basic pension.

If the earnings level for the social security contributions towards the basic pension was capped at, say, \$165 000 (roughly midway between the average earnings in the 75% to 90% group and the 90% to 95% group), the impact on contribution rates would be as follows, using the data in the base case (4.2.1.), all other assumptions unchanged.

	2018	2043	2068	2093
Cost of the old age grant	2,56%	1,76%	2,91%	3,69%
Cost of the basic pension	0,67%	3,34%	5,79%	7,33%
Total cost	3,23%	5,10%	8,70%	11,02%

This has almost doubled the long-term cost for participants except in the higher earning brackets.

The decision on the practicality of such a limit is essentially political, but the impact on participants at lower earnings levels is very material.

4.8 In summary

4.8.1 INCREASING THE POPULATION

Figure 1 shows, graphically, the results in 4.2.1, 4.2.2, 4.2.3 and 4.6.

An increase in the population is beneficial in the long term, provided it does not occur only in the lowest income group (i.e. the unemployed and those working in the informal sector) who can be expected to rely on the social old age grant, only, in retirement and who will not participate in the National Pension Fund. Such growth will increase the number of beneficiaries of the old age grant without contributing to the cost (as they will not be paying tax or paying social security contributions).

It would be reasonable to expect from this progression of results that the cost of the basic pension and old age grant will get lower if there is a shift of people higher up the earnings scale. This is explored further below.

4.8.2 GROWTH IN THE FORMAL ECONOMY, PERHAPS COMPOUNDED BY A SHIFT UP THE INCOME LADDER

Figure 2 shows the impact of a shift of people from the unemployed (or those employed in the informal sector) into those employed in the formal sector. The first set of lines reflect no change in the income distribution across those sectors and the second set shows the impact of a shift in the income distribution. The latter could occur if there is increasing demand for workers without an increase in supply through immigration.

An increasing proportion of people in the higher income brackets (with a

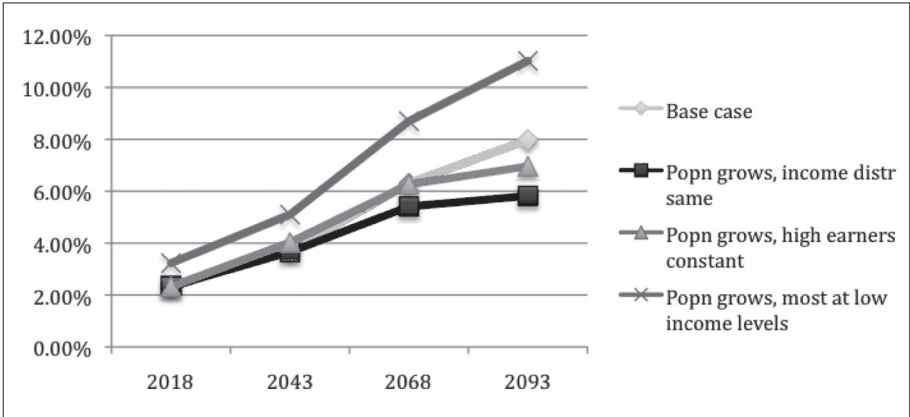


FIGURE 1 Total cost of old age grant/basic pension: Effect of increasing population

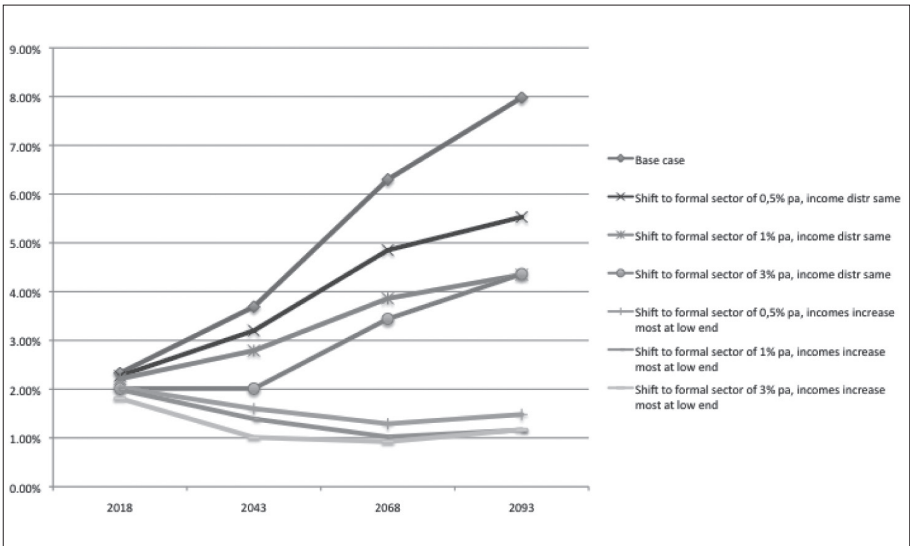


FIGURE 2 Total cost of old age grant/basic pension: Changing income distribution

corresponding reduction in the unemployed to only 10% of the workforce) has a profoundly cheapening impact on the cost of the basic pension and the cost of the old age grant. The range in the long-term cost shows the huge impact of changes in employment and income levels.

4.8.3 THE IMPACT OF PUTTING A CAP ON THE EARNINGS FOR SOCIAL SECURITY CONTRIBUTION PURPOSES

Figure 3 shows the impact of putting a cap on the earnings on which social security contributions are based (i.e. the contributions to pay for the basic pension).

The rise in cost emphasises how important it is, in a small country with highly unequal income distribution, to have the whole of the high-earning portion of the population in the “net” from which contributions are obtained.

4.8.4 IS A BASIC PENSION AFFORDABLE?

These results question the affordability of a basic pension (or old age grant as currently constituted) in the long term if the income distribution remains the same. The situation is worse if the proportion who are unemployed or employed in the informal sector increases.

As employment levels increase, and incomes rise, the cost of the basic pension and old age grant drops.

If the country can achieve, for example, an unemployment rate of 10%, and less disparity in the income levels within the economy, the basic pension/old age grant becomes eminently affordable.

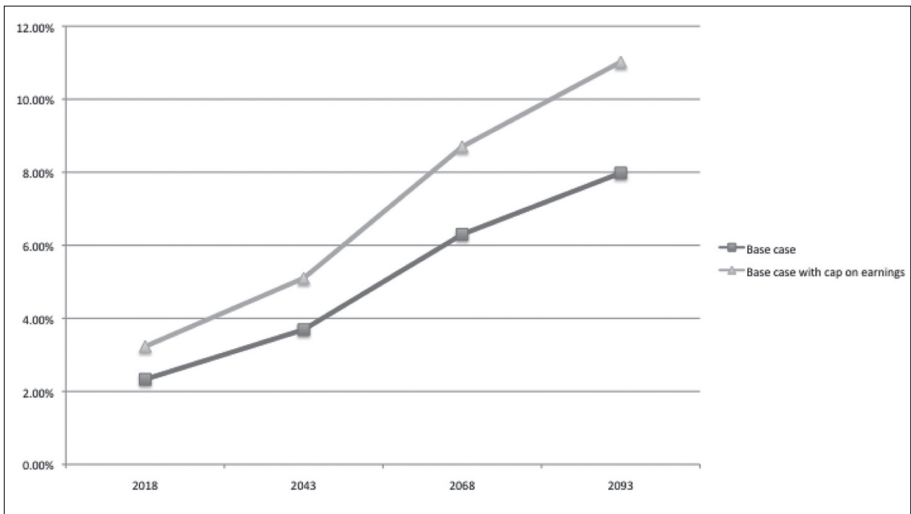


FIGURE 3 Total cost of old age grant/basic pension: Effect of a cap on earnings for social security contributions

This suggests that, if a system is introduced in the expectation that there will be economic development, and this development does not materialise, the only way the system will remain affordable is to reduce the benefits, most likely through reducing the indexation. Such a reduction will adversely affect the poverty relief aspect of the system as it is the very poor that will be affected.

5. THE USE OF AUTOMATIC ADJUSTMENT AND BALANCING MECHANISMS

In developed economies where social security is funded on either a fully, or partially, Pay as You Go basis, it has become common to introduce automatic adjustment and balancing mechanisms to accommodate improving longevity and changes in fertility rates. Such mechanisms either increase contribution rates or decrease benefits (commonly by suspending or reducing indexation of pensions), or some combination of the two.

Hagemeyer (2013) shows the projected changes in pension expenditure across the 27 countries in Europe over the period 2010 to 2060. The scale on the graph runs from -5% to +20%. Many of these countries have some automated adjustment process.

In some cases projections are performed over extended periods of time and the adjustment accommodates changes in the relationship between the long-term cost of benefits and comparable contributions.

The automated mechanism reduces the political risk associated with changing social security benefits. Gannon, Legros and Touzé (2013) note that the automatic adjustment mechanism will guarantee the solvency of the system at any date without needing political intervention, eliminating the need for large programme changes made in crisis mode. The automatic adjustment mechanism requires “straightforward and clear choices about transfers between generations and a strong underlying social acceptance.”

The series of papers presented at the Pension Benefits and Social Security symposium in 2013 indicate, however, that there is political intervention when the automated mechanism will produce a result that is politically unpalatable. An automated mechanism seems best where changes are relatively small, and where the corresponding adjustment can be spread over a period.

The difficulty with such mechanisms for small African countries with highly unequal incomes, high birth rates and high unemployment, such as the mythical country that is described above, is the potential such countries have for a very wide range of outcomes. Arguably such a range of outcomes is beyond the level at which society will accept an automated balancing mechanism without political intervention.

A basic pension funded on a Pay as You Go basis needs to be set conservatively in such an environment in order to reduce the likelihood of major change in future depending upon demographic and economic changes. The progression of costs and critical measures such as the number of people in formal employment relative to the

number unemployed or employed in the informal sector, as well as changes in the income distribution, need to be regularly monitored.

A more ambitious social security system can be built with more certainty once the economy is more mature and the future income distribution is more predictable.

This does not mean to say that the earnings-related aspect needs also to be established as conservatively. A cash balance plan with guaranteed conversion option can be established immediately. For the formal sector, this can achieve the desired 45% replacement ratio after 30 years' participation.

REFERENCES

- Gannon, F, Legros, F & Touzé, V. Automatic adjustment mechanisms and budget balancing of pension schemes. Paper presented at Pension Benefits and Social Security symposium, Lyons, February 2013
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APPENDIX 1

Breakdown of the population by age and gender

Breakdown of the population by income level

The income statistics were derived from a household survey. These were after tax incomes, and would include any members of the household who were unemployed. Unemployment was estimated at 35% and this rate was used for all groups except the top 10% of earners to gross up the figures to get amounts for those people who were working. (The rate of unemployment amongst the top 10% of earners was assumed to be zero.) Adjustment was also made for elderly members of the household who would have received a government old age grant.

The results were grossed up for income tax assuming a sliding scale and a tax rebate similar to that used in South Africa in 2013 adjusted for inflation.

The table below represents the result:

Households grouped by the earnings level of the household	Percentage of the population falling into this household group	Average annual earnings in 2012 of a worker belonging to such a household in \$		Effective tax rate
		(nett of tax)	(gross of tax)	
0 to <25%	33,5%	7 583	7 583	0%
25% to < 50%	27,4%	15 217	15 217	0%
50% to <75%	21,7%	31 203	31 203	0%
75% to < 90%	11,1%	95 196	105 084	9,4%
90% to < 95%	3,2%	186 683	227 583	18,0%
95% to < 99%	2,2%	292 083	387 060	24,6%
99% to 100%	0,9%	541 127	799 103	32,3%
Total	100,0%			
0 to <90%	93,7%	23 454	23 454	0%
90% to 100%	6,3%	289 158	382 343	24,4%

Old Age Grant

There is an old age grant of \$550 per month to every resident over the age of 60. No means test is applied.

APPENDIX 2

Population: 2012

Age range		Number of Females	Number of Males
From	To		
0	4	134 152	133 709
5	9	119 616	118 412
10	14	124 108	121 147
15	19	122 142	120 274
20	24	106 609	95 830
25	29	90 402	81 322
30	34	76 153	64 662
35	39	59 842	53 992
40	44	51 671	40 922
45	49	44 612	30 397
50	54	31 343	24 111
55	59	26 860	20 634
60	64	17 943	15 599
65	69	18 249	13 170
70	74	13 655	8 600
75	79	9 857	6 486
80	84	6 863	3 494
85	89	5 532	1 575
90	94	2 090	629
95	99	546	77
100	104	162	29
105	109	0	0
110	114	0	0

Birth rate adjustment factors			
	Medium	Low	High
2013	0,925	0,875	0,925
2018	0,875	0,78	0,875
2023	0,815	0,715	0,815
2028	0,735	0,665	0,785
2033	0,645	0,62	0,75
2038 and onwards	0,6	0,6	0,75