Pensioners under the Zimbabwe defined benefit social security scheme: Are they losers?

Henry N. Chikova and Nyasha Kaseke
Graduate School of Management; University of Zimbabwe

ABSTRACT
Private occupational schemes have expressed reservations on the way the national scheme is designed. Since the national scheme is compulsory private, schemes have complained that it is crowding them out of the pension industry. They complain that the problem is with the way the system that the national scheme uses i.e. the Defined Benefit (DB) system. They argue that this design should be reformed to the Defined Contribution (DC) system. The objective of this study is to find out whether this call to reform the national scheme has merit. It uses the concepts of time value of money and micro simulation to achieve this objective. It also made assumptions on future wage growth, inflation and returns on investment. While pensioners who die before reaching 65 years would be better off under the DC scheme, the DB scheme favours pensioners who would survive to at least 64 years. After considering the life expectancy at retirement for Zimbabwe the study showed that about eighty percent of pensioners would benefit under a DB scheme. The study concludes that the way the Zimbabwe National Pension scheme is currently designed favours its members. Pensioners would be worse off if the scheme's design were to be reformed to a DC scheme. There is no merit in the initiative by private occupational pension schemes to have the national scheme transformed to a DC scheme.

Key words: Defined contribution, Defined benefit, National Pension Scheme (NPS), Time value of money, micro simulation, net present value

INTRODUCTION
Zimbabwe went through a sustained economic decline from 2000 to 2008, characterised by hyperinflation, which officially reached 231 million percent by July 2008 (Central Statistical Office, 2008). Pensions, being fixed income receipts, lost a great deal of value. Besides hyperinflation, the introduction of multiple currencies in 2009 did not provide an official exchange rate for the moribund Zimbabwe dollar. All near money assets that had been accumulated by pension funds in Zimbabwe dollars were not converted into foreign currency and were abruptly lost. The conversion of Zimbabwe dollar pensions into US dollar pensions was done arbitrarily. Most pensioners feel cheated. They argue that the contributions they made in Zimbabwe dollars are locked up in real estate and that the National Pension scheme (NPS), run by the National Social Security Authority (NSSA), should find a way of unlocking that value and compensate them accordingly.

The above argument has since escalated to question the design of the NPS, which is a partially funded-defined benefit scheme. Most private occupational pension schemes in Zimbabwe are run along the Defined Contribution (DC) system. They are hostile towards the compulsory national scheme, accusing it of crowding them out of the pension sector. They would want the Government to reform the National scheme from a Defined Benefit (DB) to a Defined Contribution scheme. They hold the view that the DB scheme is not sustainable, overpromises contributors and will fail to deliver value to its pensioners, as was the case during

---

1 A financial system for pensions under which contribution rates are increased throughout the cycle of a pension scheme on a "step-by-step" basis (where the duration of the individual step is called the period of equilibrium). In practice the contribution rate is calculated for a defined period of years, often ranging from 10 to 25 years with the objective of equating, at the end of the period, the income from contributions and the investment income to the expenditure on benefits and administration (Cichon, et al., 2004).

2 A scheme under which contributions are paid to an individual account for each scheme member. The benefit depends on the account balance at the date of benefit withdrawal, i.e. on the amounts contributed, the interest earned and accumulated in the account as well as the administrative costs to be deducted (Cichon, et al., 2004).

3 Letter of complaint from the Zimbabwe Association of Pension Funds (ZAPF) to the Ministers of Finance, and of Labour and Social Services, October 2012.
the hyperinflationary period. Pension rights groups have also joined the fray, opining that members of the NPS will always be losers, regardless of the state of the economy, because what they are paid in pension benefits will never match their contributions plus the interest that these contributions earned. The aim of this paper is to find out whether the claim of private occupational schemes and pension rights groups that the current design of the National scheme, which is a DB system, is inferior to the DC system, is valid.

BACKGROUND TO THE STUDY
The National Social Security Authority that administers the National Pension Scheme (NPS) is a parastatal organisation that came into being through an Act of Parliament (Zimbabwe Government, 1989). Statutory Instrument 393 of 1993 is the regulatory framework that governs the NPS (Zimbabwe Government, 1993). All people who are formally employed, except those engaged in domestic work, are required by law to make monthly contributions to the NPS. The NPS scheme is a defined benefit scheme funded by contributions from both employers and employees. It is a defined benefit scheme in which benefits are defined upfront by a formula and are guaranteed. The scheme is funded along the scaled premium system and is also partially funded, where excess of contributions over benefits and administrative expenses is invested.

The scheme imposes a ceiling on insurable earnings. For the purpose of social security tax, all earnings above this ceiling are deemed to be equal to it. The NSSA Act, which governs the administration of social security schemes in Zimbabwe, requires that the NPS carries out actuarial valuations every three years (Zimbabwe Government, 1989). After receiving actuarial advice, the responsible Minister may impose parametric changes to the scheme. The NPS actuarial valuation as at 31st December 2005, advised the Minister to raise the rate of contribution from 6 percent, the 1994 inception rate, to 8 percent on 1 January 2009 (African Actuarial Consultants, 2006). In view of galloping inflation then, the same actuaries advised that the ceiling on insurable earnings should be lifted altogether. The ceiling on insurable earnings was removed in August 2008 and the rate of contribution was raised from 6 percent to 8 percent on 1 January 2009.

The Minister of Finance, in his 2010 National Budget, imposed a ceiling on insurable earnings of $200 and reduced the rate of contribution from 8% to 6%. This reform, which was not actuarially advised, was implemented on 1 May 2010. Private occupational schemes have since called for the redesign of the National Pension scheme to follow the defined contribution model. Therefore this paper argues that there may not be need to transform the defined benefit scheme to a defined contribution scheme because at the individual level the defined benefit scheme gives better financial results for pensioners than the defined contribution scheme.

STUDY OBJECTIVE
This paper seeks to investigate whether the claim that the current design of the national scheme results in its members being losers can be sustained.

HYPOTHESIS
The study tests the hypothesis that the Defined Benefit scheme is superior to a Defined Contribution scheme for Zimbabwe's National Pension scheme.

CONCEPTUAL AND THEORETICAL FRAMEWORK
Various definitions of pensions have been proffered but they point to the notion that pensions offer income security during periods of retirement when individuals are no longer economically productive to generate income for themselves and their dependents (Bertrand, et al., 2003). Some authors have noted that it is not only loss of income during retirement which pensions seek to address but that other income losses through disability are also covered (Schwarz, 2006). Pensions can be arranged at various levels; individually through
Pension systems are largely defined along two architectures; the Defined Benefit system (DB) and the Defined Contribution system (DC). Bodie et al., (1998) give a succinct comparison of the two schemes. They characterise a DC scheme as made up of employee individual accounts where regular contributions are made. Benefits levels depend on the total contributions and investment earnings of the account’s accumulation. They however overlooked the issue that expenses incurred in administering the accounts have also to be considered when finally determining the benefit level. They note that DB schemes focus on the flow of benefits which the individual will receive upon retirement. A typical DB plan determines the employee’s benefit as a function of both years of service and wage history.

There is no agreement on the best way to deliver pensions to the population. There are however two competing approaches; the ILO approach that puts emphasis on publicly mandated defined benefit schemes, and the World Bank\(^4\) model that emerged in the 1980s, which has three pillars but whose focus is on market-oriented privately managed schemes (Chikova, 2011). Pillar (ii) of the World Bank model has the characteristics of a defined contribution system. While the World Bank model diminishes the role of the state in pension provision, the ILO approach entails that the state should play a paternalistic role in the organisation and provision of pensions. This seemingly polarised approach has its roots in *Theories of Social Justice and the State* (Barr, 2004).

The World Bank approach is inclined towards the libertarian theory of social justice, which glorifies private markets and promotes individual freedoms as a way of creating economic benefits (Nozick, 1974). Libertarians further argue that the role of the State in the distribution process should be extremely circumscribed (Nozick, 1974). The ILO recognises the redistributive role the State should play in the provision of pensions. Barr (2004) ascribes this approach to the Utilitarian approach whose role is to reduce the income gap between individuals and between groups of individuals in society.

Theoretically, DC schemes are criticised for lacking intra- and inter-generational solidarity, putting squarely on the shoulders of the individual the financial risks that periods of sickness, disability and unemployment and old age pose. Since most of them are privately managed, they do not have the financial backup of government during periods of insolvency. The economic argument for defined contribution schemes is that they create savings thereby raising investment capital (Eschtruth & Triest, 2005). Since they are privately managed, it is argued that their funds are ring-fenced from direct government borrowing and the purported resultant inefficient deployment of such funds.

Some authors have conceptualised pension provision around the theory of risk management (Holzmann & Jorgensen, 2001). Holzmann and Jorgensen (2001), identify three institutions that are used to take care of risks: the market, the family and the state. They note that for risk management to work within the market and the family, a counter party is required. According to them, the problem with family and market solutions to risk management is the absence of counter parties, which results in market and family failure. As a result, individuals cannot rely solely on the market and the family for satisfying needs and taking care of risks. The state and other agencies are therefore required as they can deal with market and family failures. The risk management approach that promotes the role of Government in risk mitigation is inclined towards the ILO approach of publicly mandated schemes, as individual schemes are prone to market failure. Invariably, public pension schemes are run along the DB system.

Pension arrangements are a form of saving meant for future consumption when income streams cease. Microeconomic theories of consumption and saving behaviour, with conceptual roots in consumer choice,
have been proposed. These include the Life-Cycle hypothesis (Modigliani & Brumberg, 1954; Modigliani & Ando, 1954; Ando & Modigliani, 1963), the permanent income hypothesis (Friedman, 1957) and the relative income hypothesis (Dusenberry, 1949). The first two theories assume that individuals strive to maximize their utility or personal well-being by balancing a lifetime stream of earnings with a lifetime pattern of consumption. The relative income hypothesis emphasises on relativity of consumption level.

The life-cycle hypothesis can be applied to the savings and retirement behaviour of members of a pension scheme. According to the life cycle hypothesis, consumption needs and income are different at various points in the life cycle; younger people tend to have consumption needs that exceed their income, middle aged people generally have higher incomes and retired individuals’ income decline, and they consume out of previously accumulated savings. The implication on pensions is that younger workers should have low propensity to contribute to a pension plan, middle-aged workers should generally have no problems contributing to pensions because they have surplus income, and the level at which the retired consume depends on the amounts they would have accumulated, including pension funds, during periods of employment.

Studies have been inconclusive on the application of the Life-Cycle hypothesis to the savings behaviour of the retirees (King, 1985). Findings have shown a distortion of the Life-Cycle hypothesis Borsch-Supan (1992). This distortion has been attributed to the effects of pensions, that is, middle-aged workers do not save because they will be contributing to pension schemes and that retired individuals do not show savings decumulation behaviour because they will be consuming pensions. A number of studies, however, have found evidence of a hump-shaped pattern of savings that is consistent with the life-cycle hypothesis (Hurd, 1990; King, 1985). After controlling for personal contributions and withdrawal of benefits from pensions, Jappelli & Modigliani (1998) find evidence for the expected hump-shaped savings profile. Since life-cycle savings and consumption patterns are affected by reforms to pension plan systems e.g. from either DB to DC or vice-versa, this has implications on the wealth of a pension plan participant and their choice of a pension system.

LITERATURE REVIEW

It is important to provide a brief discussion on the performance of the two schemes because the use of the time value of money approach chosen to answer the question conceptually gives a comparison of their performance. Whenever the efficacy of a Defined Benefit (DB) scheme is discussed, invariably, the tendency has been to compare it with that of a Defined Contribution (DC) scheme. The merits and demerits of DB and DC schemes have been extensively debated. Overall the conclusion is that no scheme type is fundamentally superior to the other. Bodie, Marcus, & Merton, (1985) do not show any preference for either type of scheme. They note that the DC scheme gives members the flexibility and choice to invest in inflation hedged portfolios and that members can easily determine the true present value of the pension benefit they earn each year. They however reckon that DB schemes have potential to offer stable replacement rates of final income to workers. Madland & Bunker, (2012) conclude that all retirement plans involve tradeoffs about risk and costs, but DB schemes do fairly well for public pension schemes because they provide a more cost-effective way to ensure a level of retirement security. Microsimulation models have been used to show that DC schemes are superior because they offer lower employment costs to the employer and lower costs for employees in the event they switch employers. While Costello, (2011) notes that transition to DC from DB schemes has an advantage for younger employees, because it offers them choice for alternative investments, he points out that employees are not guaranteed a pension under DC schemes and that they will be unable

---

5 Ratio of the amount of an (average/individual) benefit in period t to the (average/individual) amount of the insurable earnings in the same or any other suitably chosen period. The rate may be calculated gross or net of taxation.
to match the return on investment realised under DB schemes. The lack of guarantee of pensions under a DC scheme has been proved to be its main disadvantage.

There is a view that DB schemes are on the decline, ostensibly giving way to DC schemes (Mackenzie, 2010; Schrager, 2009). Authors give various reasons for the supposed decline. O'Higgins & Mulroy, (2011) pointed out that employers will choose a DC scheme because it shifts away risks from them to the employee especially in times of economic crises. Bateman & Olivia, (2003) using Australian data found that DB plans were about thirty percent more expensive to run than DC plans, even controlling for plan size. They therefore concluded that this influenced the current shift from DB to DC schemes. This argument is however employercentric, as it ignores the cost to the worker related to loss of pension value under DC schemes when the economy is volatile. Rajnes, (2001) also noted that with DB schemes pension costs in a booming stock market may be zero because of investment returns on past contributions.

Banks, et al., (2005) in their study of the United Kingdom pension system, pointed out some of the individual and scheme effects of moving from a DB to a DC scheme. According to Banks et al (2005), the most important implication of shifting from a DB to a DC scheme is the transfer of investment risk from the pension sponsor to the employee. While under a DC scheme individuals can control portfolio allocation they would however incur increased costs of administering such schemes because of the absence of economies of scale. Poterba, (2004) noted that these costs could be exacerbated if individuals invest in stock in single companies. Investment risks of DB schemes are shared by pension members because there is room for intra and intergenerational risk sharing.

Banks et al (2005) further pointed out the importance of having both a private DC scheme and a State sponsored DB scheme. They gave an example of the United States where if an individual loses the entire fund under a DC scheme, the social security system, which will still give some substantial (earnings-related) benefits, can always become fall-back position. In the U.K. contracted-out plans this is not the case—the same individual would end up on means-tested support currently worth around 20% of average earnings. In Zimbabwe pensioners who lost value from private occupational pension schemes (largely run along the DC system) during the hyperinflationary period fell back to the National Pension scheme benefits for financial support.

Studies have shown that DB schemes’ investment performance is better than that of DC schemes and are exposed to less investment risk (McElreath et al., 2012). These studies were carried out by the Center for Retirement Research at Boston College from 1988 to 2004 and by Towers Watson for returns from 1995 to 2008. Two reasons were cited for the disparities in investment returns between the two pension plans; (i) DC schemes had higher additional investment expenses, which included investment fees (ii) defined benefit plans tended to use professional investment management teams to manage fund assets.

Cocco and Lopes (2004) studied individual choice between DB and DC plans in the United Kingdom. They related labour income characteristics to the choice of pension plan. They found that individuals who expect a higher growth rate of earnings are more likely to choose the DB final-salary scheme and that individuals who face a higher variance of persistent income shocks are less likely to choose DB final-salary schemes.

The apparent advantages of DC schemes over DB schemes do not show with national schemes. James et al., (2001) demonstrated that fees were high in the decentralized Chilean system of mandatory private accounts, which replaced the social security system, contrary to popular belief that private accounts would reduce administrative expenses due to competition. Experts have also pointed out that there is lack of evidence to support the claim that individual accounts at national level would significantly increase national savings (Mesa-Lago, 1994).

This paper seeks to show that the push towards reforming the National pension scheme in Zimbabwe, from a DB to a DC scheme, should not be informed by the imaginary advantages of a DC scheme to pensioners. The paper will demonstrate that the current design of the scheme gives pensioners positive net gain on their contributions. The push for reforms may therefore be serving other purposes and should not be blamed on the supposedly “faulty” DB design of the National Pension scheme.
METHODOLOGY

The study uses secondary data on salaries obtained from the Workers Compensation Insurance Fund injury data to project future value of contributions and present value of pensions at retirement. It applies the salary data, using the concepts of time value of money and micro simulation, to determine whether a member of the National pension scheme, a DB scheme, would lose out when the future value of contributions are compared to the present value of pensions at retirement. The future value of contributions is the same as the accumulated pension amount under the Defined Contribution scheme, implying that comparing it with the present value of pensions under a DB scheme is the same as comparing financial payoffs of a DC and a DB scheme.

The model

The model is a two-period model; the first period is the contribution period and the other period is the retirement period. Age 60 years, the retirement age, divides the two periods. The model assumes that the last contribution payment is made concomitantly with the first pension payment at age 60 years. A DB scheme is superior to a DC scheme if

$$PVDBR - FVDCR = 0$$

or

$$PVDBR - FVDCR > 0$$

where $PVDBR$ is the present value, at retirement, of the stream of annual pension receipts under a defined benefit scheme and $FVDCR$ is the future value of contributions at retirement. Under a DB scheme the expression $PVDBR - FVDCR$ also denotes the net present value of pensions (NPV), which is the difference between the present value of pensions and the future value of contributions at retirement. This paper analyses the behaviour of the NPV of pensions by age at death after retirement. In other words for all positive NPVs the DB scheme is superior to the DC scheme.

Estimating future value of contributions

We first start by projecting the future value of contributions at retirement using the future value of a growing annuity formula — assuming that once a member joins the scheme, he/she survives to retirement age. For a member who joins the scheme at age $x$ the future value of contributions at retirement, i.e. the total pension value at retirement under a DC Scheme, is

$$FV_{Cont} = C_x \left[ \frac{(1 + r)n - (1 + g)}{r - g} \right]$$

The analysis also assumes that contributors of different ages enter the scheme at the same date. $C_x$ is the amount of contributions at entry age into the scheme i.e. age $x$, $r$ is the rate of return per period, $g$ is the growth rate of salaries, and $n$ is the number of years to retirement. $C_x$ is obtained by multiplying the annual salary $S_x$ with the rate of contribution $c$ — set at 6%, and a factor of 0.90, assuming that administrative expenses are 10% of contributions (ILO, 2012). In other words $C_x = 0.90 c S_x$. This analysis assumes that there is no ceiling on insurable earnings.

* All financial figures are in United States Dollars

University of Zimbabwe Business Review, Volume 2, No. 2, 2014
In Zimbabwe, there is no salary discrimination between males and females, so average age-specific salaries apply to both sexes. Currently Zimbabwe lacks reliable wage data. This paper uses data obtained from submitted Workers' Compensation claims to calculate average age-specific salaries. These were then modelled to suit the Zimbabwe age-salary pattern, which increases by age to about 40 years before levelling off. The age-salary pattern is plotted in Figure 1 below.

We also make another assumption that no member will join the scheme after the age of 50 years because, according to the rules of the scheme, a pension can only be paid to someone who would have contributed for at least 10 years (Zimbabwe Government, 1993).

For equation (iii) to be meaningful the relationship \( r > g \) should be maintained. This requirement is satisfied by the in-built assumption in this analysis that \( r > g > f \), where \( f \) is the rate of inflation.

Estimating the present value of benefits
Next, we estimate the present value of future pension cash flows. Once determined at retirement, the pension is assumed to be indexed to inflation; hence it is assumed that pensions will be increasing yearly by the rate of inflation. This makes the calculation of the present value of pensions amenable to applying the formula for estimating the present value of a growing annuity as follows:

\[
PVR = \frac{P}{r-f} \left( 1 - \frac{1+f}{f+r} \right)^n
\]  

(Source: Workers Compensation Insurance Fund claims returns, 2013)
\( P_{60} \) is the pension at retirement - a product of the number of years of contribution \( x \) salary at retirement \( x \) an accrual factor (Zimbabwe Government, 1993). Precisely \( P_{60} = \text{yrs} \times S_{60} \times 1.333\% \), where \( \text{yrs} \) are the years of contribution, \( S_{60} \) is the salary at retirement and \( 1.333\% \) is the accrual factor. We add \( P_{60} \) to equation (iv) to cater for the pension payment made right at retirement.

This analysis considers a scenario of certainty of survival to a higher age. Put differently, it assumes that if age at death is, say, 80 years for a pensioner, the pensioner will certainly survive to this age.

The analysis of the payoff of the DB scheme (stylised as the Net Present Value of pensions at retirement under the DB scheme or the present value of pensions under the DB scheme at retirement minus the future value of contributions under the DC scheme at retirement), considers the assumptions used by the ILO actuaries (ILO, 2012) in evaluating the NPS scheme as at 31st December 2010. They assumed that the future growths of wages, inflation and rate of return are 5%, 4% and 5.5% respectively. The analysis also assumes that the rate of contribution will remain constant at 6% throughout the years of contribution.

RESULTS
Future Value of Contributions
Table 1 shows the future value of contributions at retirement for the assumed rate of contribution of 6%, future growths of wages of 5% and rate of return of 5.5%.

<table>
<thead>
<tr>
<th>Age at entry</th>
<th>FV of Contributions at retirement (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>23,445.3</td>
</tr>
<tr>
<td>25</td>
<td>34,801.46</td>
</tr>
<tr>
<td>30</td>
<td>31,405.65</td>
</tr>
<tr>
<td>35</td>
<td>23,356.39</td>
</tr>
<tr>
<td>40</td>
<td>15,268.52</td>
</tr>
<tr>
<td>45</td>
<td>8,853.09</td>
</tr>
<tr>
<td>50</td>
<td>4,402.68</td>
</tr>
</tbody>
</table>

As the age at entry into the scheme increases, the future value of contributions also increases for ages at entry up to age 26 years. The sharp rise by age in the future value of contributions for younger ages at entry reflects the steeper increase of wages by age for these ages. This, combined with longer periods of contribution, ends in the rise of the future value of contributions at retirement that plateaus at age at entry into the scheme of 26 years. Beyond age at entry of 26 years, the rise in wages levels off and this combined with progressively shorter periods of contributions results in a declining age at entry pattern of future value of contributions. If we combined age at entry, age-specific salary and years to retirement, a member of the scheme who joins at age 26 years has the highest future value of contributions at retirement.

Pensions pattern
Like the future value of contributions, as the age at entry into the scheme increases, for ages at entry below 27 years, the present value of benefits at retirement will be increasing with age at entry, before declining. Table 2 and Figure 3 also show that the present value of pensions at retirement increases with age at death. This is regardless of age at entry into the scheme.
Pensioners under the Zimbabwe defined benefit social security scheme: Are they losers?

### Table 2: Present Value of pensions at retirement by age at entry and age at death

<table>
<thead>
<tr>
<th>Age at entry</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5 186.53</td>
<td>29 078.13</td>
<td>51 318.90</td>
<td>72 022.89</td>
<td>91 296.30</td>
<td>109 237.97</td>
</tr>
<tr>
<td>25</td>
<td>8 016.12</td>
<td>44 942.13</td>
<td>79 316.66</td>
<td>11 1316.01</td>
<td>141 104.30</td>
<td>168 834.31</td>
</tr>
<tr>
<td>30</td>
<td>7 393.80</td>
<td>42 574.42</td>
<td>75 137.98</td>
<td>105 451.50</td>
<td>133 670.43</td>
<td>159 939.53</td>
</tr>
<tr>
<td>35</td>
<td>5 716.46</td>
<td>32 049.18</td>
<td>56 562.38</td>
<td>79 381.79</td>
<td>100 624.45</td>
<td>120 399.30</td>
</tr>
<tr>
<td>40</td>
<td>3 782.41</td>
<td>21 205.95</td>
<td>37 425.58</td>
<td>52 524.48</td>
<td>66 580.09</td>
<td>79 664.50</td>
</tr>
<tr>
<td>45</td>
<td>2 219.71</td>
<td>12 444.72</td>
<td>21 963.21</td>
<td>30 824.00</td>
<td>39 072.54</td>
<td>46 751.12</td>
</tr>
<tr>
<td>50</td>
<td>1 117.19</td>
<td>6 263.49</td>
<td>11 054.19</td>
<td>15 513.87</td>
<td>19 665.41</td>
<td>23 530.08</td>
</tr>
</tbody>
</table>

The present value of pensions is a positive linear function of age-at-death. This is expected because as more discounting periods are added the present value also increases.

**Defined Benefit scheme’s payoff**

Table 3 and Figure 3 show that all pensioners who survive to 65 years would have positive payoffs under the DB scheme indicating that the DB scheme is better than the DC scheme to contributors who survive for more than 5 years after retirement. This is regardless of age at entry into the scheme. The pensioner who receives the worst pay-off is the one who enters the scheme at 25 years and dies at retirement whilst the one who benefits most would have entered the scheme 27 years and dies at 85 years. From age at death 65 to 85 years, the payoff increases with age at death. The relationship between age at entry and payoff follows that between age-at-entry and present value of benefits, as shown in Figure 2 above. Figure 3 shows the relationship between age at entry into the scheme, age at death and the net present value of a DB scheme.
Table 3: Age at entry, age at death and the DB scheme payoffs

<table>
<thead>
<tr>
<th>Age at Death</th>
<th>60</th>
<th>61</th>
<th>62</th>
<th>63</th>
<th>64</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>-18 258.8</td>
<td>-13 342.6</td>
<td>-8 496.4</td>
<td>-3 719.0</td>
<td>990.4</td>
<td>5 632.8</td>
<td>27 873.6</td>
<td>48 577.6</td>
<td>67 851.0</td>
<td>85 792.7</td>
</tr>
<tr>
<td>21</td>
<td>-21 497.5</td>
<td>-15 652.7</td>
<td>-9 891.1</td>
<td>-4 211.4</td>
<td>1 387.5</td>
<td>6 906.8</td>
<td>33 348.5</td>
<td>57 963.1</td>
<td>80 876.8</td>
<td>102 207.4</td>
</tr>
<tr>
<td>22</td>
<td>-23 839.9</td>
<td>-17 292.9</td>
<td>-10 838.9</td>
<td>-4 476.6</td>
<td>1 795.1</td>
<td>7 977.7</td>
<td>37 596.8</td>
<td>65 169.4</td>
<td>90 836.7</td>
<td>114 730.6</td>
</tr>
</tbody>
</table>

Figure 3: Age at entry, age at death and net present value

DISCUSSION
This study has shown that under the national pension scheme of the National Social Security Authority, which is a DB scheme, the future value of contributions at retirement represents pension accumulation under a DC scheme. By applying this reasoning, a comparison of the present value of pensions and the future value of contributions at retirement shows which scheme design (i.e. DB or DC) is more beneficial to contributors.

Results of the study largely favour a DB scheme. They also show that under the assumption of a constant rate of return and a uniform wage growth the DC system does not necessarily favour younger workers.
because they start contributing at relatively lower wages compared to older age groups. This is contrary to Costello (2011)'s assertion that DC schemes give advantage to younger workers. Costello’s argument is that younger workers have a longer investment horizon before retirement, which enables them to pursue investments with better returns. Realisation of higher returns for young workers is only possible under conditions of rising yield curves and where financial markets are robust. In the investment environment characteristic of Zimbabwe, where investment possibilities are narrow and where yield curves are fickle, it may be difficult for young workers to have ample investment choices.

Findings of this analysis have shown that life expectancy at retirement (in this model under the assumption of certainty of survival to age at death) is the most influential determinant in this debate. Pensioners who survive to at least 64 years would rather choose a DB scheme. It is only those who die within the first five years of being pensioned who are better rewarded by the DC scheme. This discussion would therefore be incomplete if it does not refer to life expectancy at retirement for Zimbabwean pensioners. The life expectancy at 60 years for Zimbabwe, for both sexes combined, using the 2002 Population census was 16.3 years (Central Statistical Office, n.d.). This implies that a pensioner can survive to 76 years on average. It can therefore be concluded that a DB scheme is superior to a DC scheme in 13 out of 16 years. Put differently a DB scheme would have a higher payoff than a DC scheme for 81 percent of pensioners confirming Madland & Bunker, (2012)'s finding that DB schemes do fairly well for public pension schemes.

CONCLUSION

The objective of this study was to find out which pension system, the Defined Benefit and Defined Contribution, is superior for the Zimbabwe national social security scheme. The study used micro simulation and the time value of money concepts to analyse the trade-off between the two pension systems. It also made assumptions on future wage growth, inflation and returns on investment. While pensioners who die before reaching 64 years would be better off under the DC scheme, the DB scheme favours pensioners who would survive to at least 65 years. After considering the life expectancy at retirement for Zimbabwe, the study showed that nearly eighty-one percent of pensioners would benefit under a DB scheme. This brings us to the conclusion that the way the Zimbabwe National Pension scheme is currently designed, favours its members. Pensioners would be worse off if the scheme’s design were to be reformed to a DC scheme. This finding obstructs us from rejecting the null hypothesis set for the study. Therefore, there is no merit in the initiative by private occupational pension schemes to have the national scheme transformed to a DC scheme. However, it would be stimulating to further research on whether one will arrive at the same conclusion under conditions of uncertainty of survival to a higher age for pensioners, and where parameters of the model; wage growth, inflation and rate of return, are varied.

REFERENCES


Central Statistical Office, 2008. CPI All items Index, Harare: CSO.


