

**DRW Investment Research**

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**Adjustments in retirement spending with declines in retirement fund values**

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## **Introduction:**

Most retirees opt for the investment-linked life annuity (ILLA), or commonly known as a living annuity, when they retire from their retirement funds because it offers flexibility of income and investment choice. Moreover, it has the option of bequeathing residual capital to beneficiaries, which is not possible with conventional guaranteed life annuities. Living annuities, however, do not come without risks – one major risk is that because of a lengthy period of poor market returns, the capital value of a living annuity will be reduced to such an extent that it won't be possible to sustain the expected income levels going forward.

What possible pro-active measures can a retiree implement to prevent such a catastrophic event?

First, it is about starting off with a realistic withdrawal (drawdown) rate, not drawing down more than 6% of the fund value, but preferably 5% and less if one is planning for a post-retirement period of up to 30 years. Second, investment (fund) selection – it's best to consult experts with the selection and balancing process. Third, the flexibility to change one's income withdrawals (retirement spending) from year to year, and re-aligning it with situations where portfolio returns may turn out negative, hence leading to declines in fund values (besides regularly drawing down retirement income from the portfolio).

The first two actions refer to the planning and setting up of the retirement plan, while the last measure is a tactical ploy really while already in retirement, and adjusting the drawdown to safeguard against a drastic shortening of the longevity of the retirement plan.

**Focus:**

This discussion focuses on the latter option – what possible remedial actions can be taken to protect the future long-term viability of the retirement plan, more specifically, at the annual “income review” (every 12 months) where the retiree must elect her income for the next 12 months. Ideally, one would have wanted a constant income stream, adjusting for inflation each year, but market returns are not constant, and negative returns (or very low positive returns) from one year to the next may have a detrimental impact on the long-term sustainability of the plan. Thus, retirees should be able to change their expected income levels as portfolio values may decline from one period to the next.

## **Adjustment strategies:**

Various adjustments in retirement spending are considered whenever the capital value of the retirement fund drops below its value at the start of the review period, typically at the annual “income review” stage, i.e. when the retirement income for the forthcoming 12 months will be assessed.

- First, a retiree may decide to leave her current income the same, thus foregoing any increase in the forthcoming year. Thereafter, when the investment portfolio returns exceed the withdrawals from the plan, and thus leading to an increase in the capital value from the previous year’s balance, the income level is increased with the prevailing inflation rate. The cycle is repeated over the duration of the retirement plan.
- Second, after retirement income had been kept constant for a period following fund value declines, thereafter, if capital values at the income review stage is higher than the previous period, the increase in income will make up for the period(s) it was not increased, thus compensating for the period(s) the income were not increased and a relatively large jump in income will be expected. The cycle is repeated over the duration of the retirement plan.
- Third, reducing current retirement income by a certain percentage for the forthcoming period whenever capital values at “income review” is lower than the previous year. Thus, the retiree not only accepts a reduction in nominal retirement income, but also forsakes an inflation-adjustment of income for the forthcoming period. Thereafter, once capital values are higher than it was in the previous period, the retirement income level is restored to its original path. The cycle is repeated over the duration of the retirement plan.

- Fourth, whenever capital value at “income review” is lower than its value in the previous period, make a permanent adjustment in the rate in which retirement income will be increased each year to compensate for inflation. For example, at “income review” increase the retirement income with, say, one or two percentage points lower than the prevailing inflation rate. Thereafter, irrespective whether the capital value improves or not, maintain the same “inflation less x percentage point” adjustment.

## Methodology:

Consider the following scenario:

A person is retiring with R5 million in retirement capital and requires an initial income of R300,000 per annum. Funds are invested with a moderate risk profile in mind, an expected portfolio return of 8.5% per annum and a standard deviation of 10% (two-thirds of the time portfolio returns will fluctuate between -1.5% and 18.5% per annum). Inflation is expected to average around 5% per annum, with a 1% standard deviation, thus two-thirds of the time between 4% and 6% per annum. These parameters (portfolio returns and inflation) are simulated over a thirty-year post-retirement period.

The retiree will follow an income adjustment strategy whenever the capital value at the end of a period is 95% and less than the value at the start of the period, typically over a 12-month period, then the retirement income will be kept at the same level for the forthcoming period. Thus, a 5% capital reduction (from one period to the next) is allowed before an adjustment of the retirement income will be implemented. Thereafter, when the capital value at the end of a next period is higher than its starting value, income will be adjusted upwards in line with the prevailing inflation rate.

Table 1: Simulated output

Period	begin	Inflation	Inflation WD	Actual WD	Actual WD%	Sim return	end
1	5,000,000	3.4%	300,000	300,000	6.0%	14.7%	5,389,694
2	5,389,694	5.0%	310,149	310,149	5.8%	6.2%	5,393,294
3	5,393,294	4.0%	325,590	325,590	6.0%	9.7%	5,561,187
4	5,561,187	4.4%	338,645	338,645	6.1%	11.3%	5,814,141
5	5,814,141	4.1%	353,633	353,633	6.1%	-0.8%	5,416,863
6	5,416,863	4.5%	368,054	353,633	6.5%	7.7%	5,451,191
7	5,451,191	4.1%	384,668	369,596	6.8%	12.8%	5,734,412
8	5,734,412	6.1%	400,272	384,588	6.7%	8.7%	5,814,146
9	5,814,146	6.1%	424,587	407,951	7.0%	10.4%	5,969,554

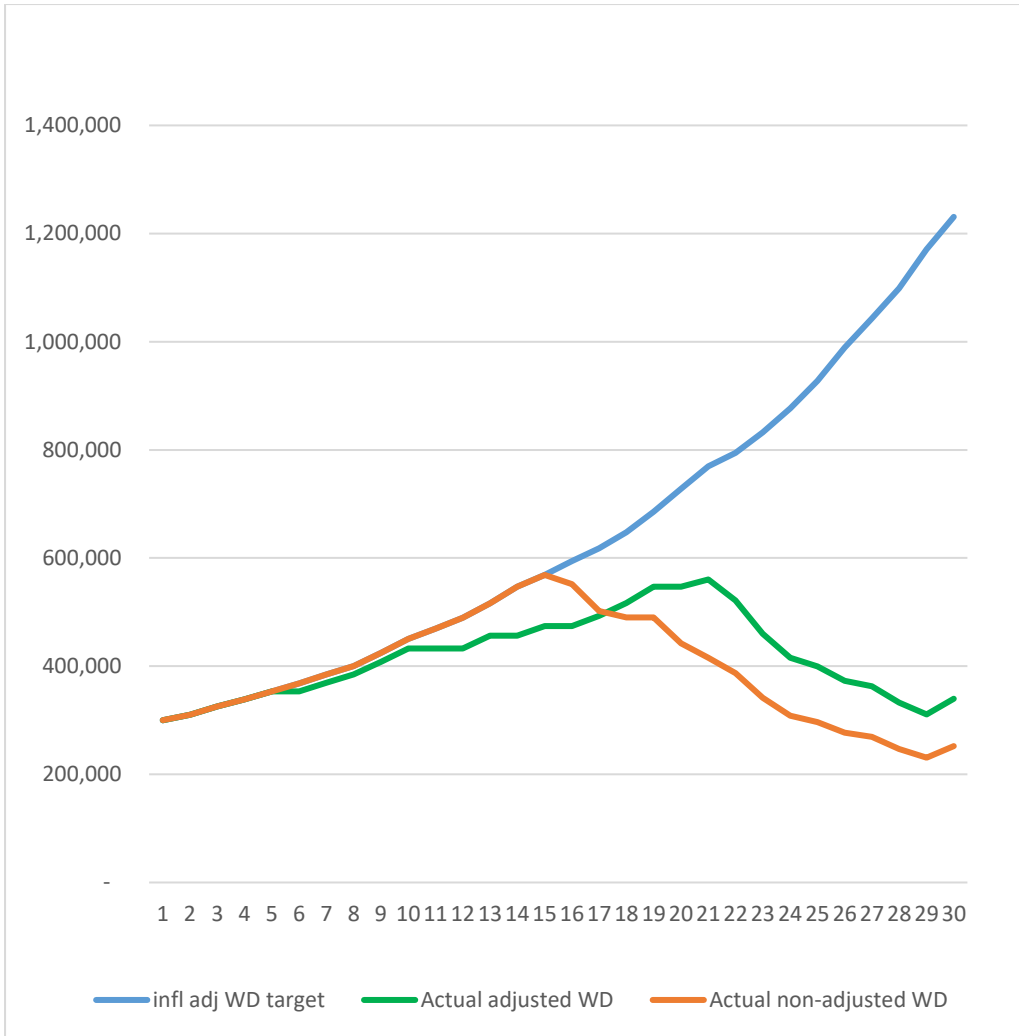
Period	begin	Inflation	Inflation WD	Actual WD	Actual WD%	Sim return	end
10	5,969,554	4.2%	450,577	432,923	7.3%	1.0%	5,591,242
11	5,591,242	4.4%	469,380	432,923	7.7%	-11.9%	4,545,914
12	4,545,914	5.4%	489,803	432,923	9.5%	27.6%	5,249,588
13	5,249,588	6.0%	516,170	456,228	8.7%	-7.5%	4,434,641
14	4,434,641	3.9%	547,101	456,228	10.3%	6.1%	4,219,185
15	4,219,185	4.5%	568,672	474,217	11.2%	-3.8%	3,602,273
16	3,602,273	4.0%	594,289	474,217	13.2%	10.3%	3,449,019
17	3,449,019	4.8%	617,912	493,067	14.3%	18.4%	3,500,809
18	3,500,809	5.9%	647,471	516,654	14.8%	21.1%	3,615,115
19	3,615,115	6.2%	685,569	547,054	15.1%	9.4%	3,356,562
20	3,356,562	5.7%	727,911	547,054	16.3%	14.0%	3,201,872
21	3,201,872	3.3%	769,559	560,328	17.5%	12.9%	2,981,174
22	2,981,174	4.7%	794,682	521,705	17.5%	6.9%	2,628,413
23	2,628,413	5.3%	832,237	459,972	17.5%	9.5%	2,374,859
24	2,374,859	5.8%	876,694	415,600	17.5%	16.6%	2,283,564
25	2,283,564	6.6%	927,570	399,624	17.5%	13.2%	2,132,751
26	2,132,751	5.4%	989,240	373,232	17.5%	17.8%	2,072,883
27	2,072,883	5.3%	1,043,017	362,754	17.5%	11.2%	1,901,601
28	1,901,601	6.6%	1,098,602	332,780	17.5%	13.3%	1,777,602
29	1,777,602	5.1%	1,171,087	311,080	17.5%	32.4%	1,942,278
30	1,942,278	5.1%	1,230,830	339,899	17.5%	-4.8%	1,526,209

### Explanation of terminology:

- “Inflation” = simulated result, 5% expected, 1% SD.
- “Inflation WD” = retirement income adjusted with previous period’s inflation rate.
- “Actual WD” = actual retirement income withdrawn in period, depending on whether an adjustment in retirement spending was required or not. An overriding rule will always apply, irrespective of adjustment strategy - the annual retirement income may not be less than 2.5% or more than 17.5% of the capital value at the “income review” stage.
- “Actual WD %” = actual retirement income as a percentage of retirement capital at “income review”. Once it reaches 17.5% (upper boundary) the plan has reached the end of its sustainability, thereafter annual income will drop off, as it is very unlikely that portfolio returns will exceed persistently these withdrawal levels.

To establish what benefit the adjustment in retirement income holds over and above a “no-adjustment” or default strategy, the results are compared by using the same portfolio returns and inflation rates for each strategy. The results are shown in terms of the real value (stripping out inflationary effects from the number) of the retirement income after, say, a twenty-year post-retirement period, the capital available (in real terms) at the end of twenty years, and the number of sustainable post-retirement income years gained by following the adjustment strategy. The latter is determined by comparing the number of years before the plan reaches the maximum withdrawal rate of 17.5% per annum.





Graph 1: Simulated output of income yielded by adjustment strategy and default

Table 2: Comparison after 20 years into the retirement plan:

	Adjustment	Default
Longevity (# years before reaching 17.5% withdrawal rate)	20 years	15 years
Adjustments required in the first 20 years	6	-
Real income (% of initial income)	75%	61%
Real capital available (% of initial capital)	24%	18%

The adjustment strategy would have gained 5 post-retirement years, which is material, and the income paid in the 20<sup>th</sup> year would have been higher than with the no -adjustment strategy. Moreover, more “legacy” capital would have been available at that stage. In short, the adjustment strategy certainly added value.

But, obviously, a more diligent approach is needed than running only one simulation to establish whether such an adjustment strategy holds value in many possible return scenarios. Therefore, the simulation is repeated multiple (1,000) times and a probability distribution is generated of the likelihood that the adjustment strategy would have added value.

This process was then repeated for all adjustment strategies discussed above and the results are shown in the next section.

## Evaluating retirement income adjustment strategies:

### Results from multiple simulations

#### General assumptions:

- Initial withdrawal rate = 6% of retirement fund value.
  - The objective is to escalate retirement income with the inflation rate every year.
  - The actual income escalation will depend whether an adjustment strategy will apply or not.
  - The income withdrawn is subject to a minimum withdrawal of 2.5% or maximum withdrawal of 17.5% of retirement fund value at the end of each review period.
1. Adjustment strategy: When fund value at the end of the period is 95% or less of the value at the start of the period; zero escalation; thereafter, when fund value at the end of a next period is more than its value at the start of that period, increase income with the inflation rate.

Table 3: Output of adjustment strategy 1 versus default

Percentile	Longevity adjustment	Longevity default	Adjustment First 20 years	Real income adjustment	Real income default	Real Capital adjustment	Real Capital default
10%	14	10	11	27%	20%	8%	6%
25%	17	13	9	46%	32%	13%	9%
50%	22	16	6	73%	58%	28%	17%
75%	29	21	4	82%	100%	51%	37%
90%	30	30	3	89%	100%	82%	73%

At the median (50<sup>th</sup> percentile) the retiree would have gained an additional six income-sustainable post-retirement years with the implementation of the adjustment strategy. The actual real income in the 20<sup>th</sup> post-retirement year would have been 73% versus 58% of the original income at the start of the retirement plan. The capital available at the end of the 20<sup>th</sup> year would have been 28% versus 17% of the initial retirement capital. During the first 20 post-retirement years, the retiree would have implemented the adjustment strategy six times.

2. Adjustment strategy: When fund value at the end of the period is 95% or less of the value at the start of the period; zero escalation; thereafter, when fund value at the end of a next period is more than its value at the start of that period, increase income to the level it should have been without any adjustment.

Table 4: Output of adjustment strategy 2 versus default

Percentile	Longevity adjustment	Longevity default	Adjustment First 20 years	Real income adjustment	Real income default	Real Capital adjustment	Real Capital default
10%	11	10	12	23%	21%	6%	6%
25%	14	13	10	36%	33%	10%	10%
50%	18	17	7	70%	64%	20%	19%
75%	24	22	4	97%	100%	44%	42%
90%	30	30	2	100%	100%	78%	76%

At the median (50<sup>th</sup> percentile) the retiree would have gained an additional one income-sustainable post-retirement year with the implementation of the adjustment strategy. The actual real income in the 20<sup>th</sup> post-retirement year would have been 70% versus 64% of the original income at the start of

the retirement plan. The capital available at the end of the 20<sup>th</sup> year would have been 20% versus 19% of the initial retirement capital. During the first 20 post-retirement years, the retiree would have implemented the adjustment strategy seven times.

3. Adjustment strategy: When fund value at the end of the period is 95% or less of the value at the start of the period; accepts a reduction of 5% of current income (no inflation-adjustment) for the new period; thereafter, when fund value at the end of a next period is more than its value at the start of a period, increase income to the level it should have been without any adjustment.

Table 5: Output of adjustment strategy 3 versus default

Percentile	Longevity adjustment	Longevity default	Adjustment First 20 years	Real income adjustment	Real income default	Real Capital adjustment	Real Capital default
10%	12	10	13	24%	21%	7%	6%
25%	14	13	11	39%	33%	11%	9%
50%	18	16	8	70%	60%	21%	17%
75%	24	22	5	100%	100%	47%	42%
90%	30	29	3	100%	100%	81%	78%

At the median (50<sup>th</sup> percentile) the retiree would have gained an additional two income-sustainable post-retirement years with the implementation of the adjustment strategy. The actual real income in the 20<sup>th</sup> post-retirement year would have been 70% versus 60% of the original income at the start of the retirement plan. The capital available at the end of the 20<sup>th</sup> year would have been 21% versus 17%

of the initial retirement capital. During the first 20 post-retirement years, the retiree would have implemented the adjustment strategy eight times.

4. Adjustment strategy: When fund value at the end of the period is 95% or less of the value at the start of the period; adjust income escalation by the inflation rate less a permanent reduction of two percentage points; thereafter, irrespective whether fund values improve or not, maintain the same escalation rate (inflation rate less two percentage points).

Table 6: Output of adjustment strategy 4 versus default

Percentile	Longevity adjustment	Longevity default	Real income adjustment	Real income default	Real Capital adjustment	Real Capital default
10%	12	10	25%	21%	7%	6%
25%	16	13	43%	32%	13%	9%
50%	22	16	69%	60%	30%	17%
75%	30	22	75%	100%	60%	42%
90%	30	30	81%	100%	92%	77%

At the median (50<sup>th</sup> percentile) the retiree would have gained an additional six income-sustainable post-retirement years with the implementation of the adjustment strategy. The actual real income in the 20<sup>th</sup> post-retirement year would have been 69% versus 60% of the original income at the start of the retirement plan. The capital available at the end of the 20<sup>th</sup> year would have been 30% versus 17% of the initial retirement capital.

### Comparing the adjustment strategies:

Next, the strategies are compared with each other by using the same inflation and portfolio return figures for a thirty-year post-retirement period. Furthermore, the same assumptions than before, were applied.

Table 7: Inflation and portfolio returns used in the comparative analysis

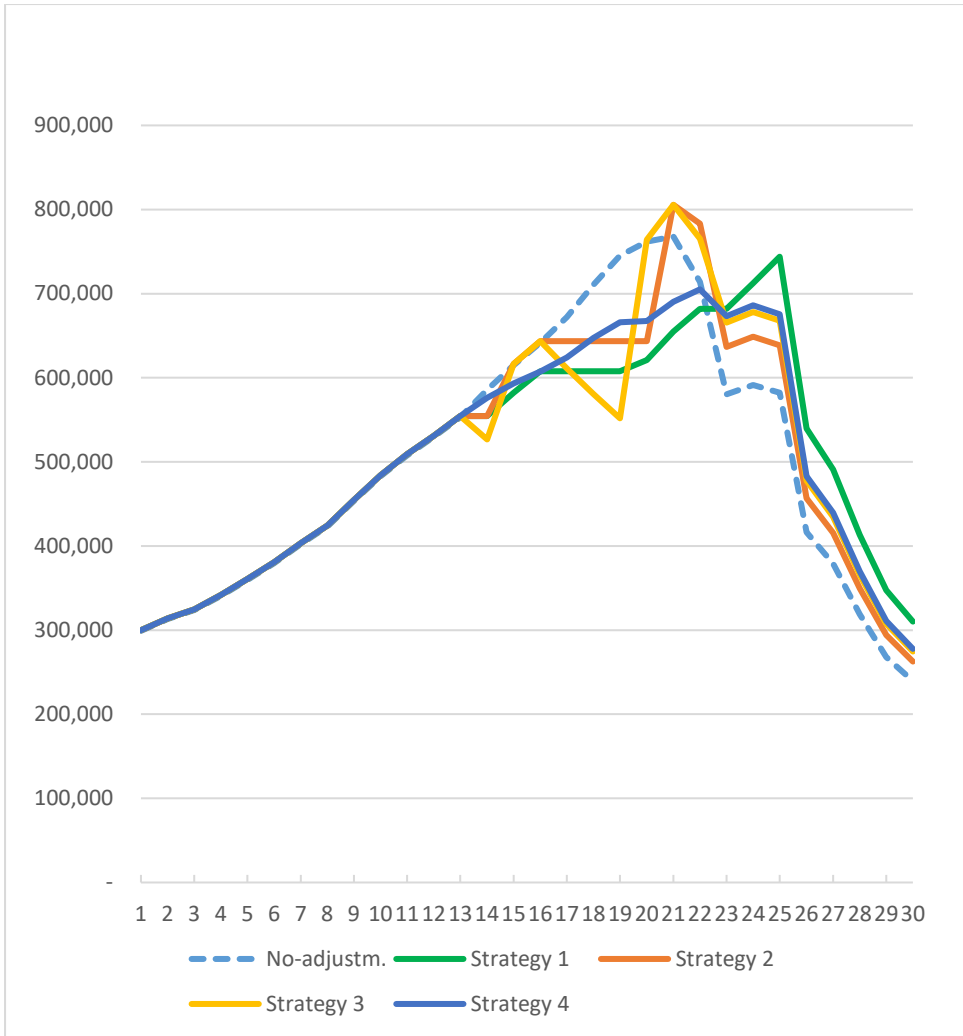
Period	Inflation simulated	Portfolio return simulated
1	4.7%	10.9%
2	3.4%	5.7%
3	5.2%	7.6%
4	5.6%	12.6%
5	5.5%	13.7%
6	6.0%	12.6%
7	5.2%	25.4%
8	7.2%	16.5%
9	6.5%	9.2%
10	5.1%	9.6%
11	4.3%	7.6%
12	4.4%	5.0%
13	5.9%	-0.9%
14	5.0%	6.1%
15	4.4%	7.8%
16	4.7%	-2.5%
17	5.7%	-10.1%

Period	Inflation simulated	Portfolio return simulated
18	4.9%	4.3%
19	2.2%	8.7%
20	5.4%	15.9%
21	4.1%	12.7%
22	7.3%	-1.5%
23	4.4%	23.5%
24	4.4%	19.3%
25	3.4%	-13.3%
26	6.6%	10.3%
27	4.7%	2.0%
28	5.6%	1.9%
29	6.2%	8.3%
30	3.2%	4.7%



Table 8: Output of comparative analysis – default and adjustment strategies

	Default	Strategy 1	Strategy 2	Strategy 3	Strategy 4
Longevity (years)	20	25	21	22	22
Adjustments required	0	4	5	4	1
Real income in 20 <sup>th</sup> year (% of original income in real terms)	100%	81%	84%	100%	87%
Real capital at the end of 20 <sup>th</sup> year (% of original capital in real terms)	34%	39%	38%	39%	38%



Graph 2: Strategies compared - income yielded over time

An alternative method to compare the adjustment strategies is to determine the maximum initial withdrawal rate that each strategy would afford over different time intervals. It is calculated by projecting the income need at the 20<sup>th</sup>, 25<sup>th</sup> and 30<sup>th</sup> post-retirement year; then determining the amount of retirement capital needed where the income is equal to 17.5% of capital value at each of those intervals; and lastly determining the initial drawdown rate (portfolio returns are known) to meet those specific capital targets.

Table 9: Maximum initial withdrawal rate that applied in this scenario

Post-retirement period	20 years	25 years	30 years
Default	6.0%	5.4%	4.5%
Strategy 1	6.2%	5.7%	4.9%
Strategy 2	6.1%	5.5%	4.6%
Strategy 3	6.2%	5.5%	4.6%
Strategy 4	6.1%	5.6%	4.8%

Thus, the adjustment strategies boost in effect the maximum drawdown rate that otherwise would have been applicable if no adjustments to retirement spending were not made during the post-retirement period.

## **Synopsis:**

The basic premise of adjusting retirement income or spending is to prolong the longevity of the retirement plan amidst declining retirement fund values because of poor market returns over a period. Four retirement income adjustment strategies have been considered – typically, the more radical the intervention, the better longevity protection of the retirement plan will result, some strategies have more immediate income implications than others, and thus it depends on the overall financial situation of the retiree whether such adjustment strategies could be applied or not.

The fourth strategy where income is escalated every year with  $x$  percentage points below the inflation rate is in many instances probably the most practical and least disruptive to most retirees. It does not have a sharp, corrective measure such as a decline in income or zero increase, yet, it added some additional retirement income years beyond the no-adjustment strategy. For others, who have more leniency and flexibility towards immediate retirement income needs, the zero-increase adjustment strategy (strategy 1) and a reduction in income (strategy 3), or combinations thereof will offer good longevity protection.