DRW Investment Research

The Short Series on Retirement Planning

4th Edition

Evaluating the outcome of different drawdown rules at various initial drawdown rates

By

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This is the third and final article in which I evaluated various retirement income drawdown (spending) strategies that one can apply in managing your annuity income from a living annuity product.

I've listed four possible drawdown rules, namely *fixed percentage*, *inflation-adjusted annuity income*, *target drawdown percentage* and a *combination* of the latter two rules.[1]

In the first two articles, I evaluated, firstly, the outcome of each drawdown rule under a specific set of market return conditions and, secondly, when different initial withdrawal or drawdown rates would have applied for a hypothetical post-retirement period of thirty years.[2]

I evaluated each rule against two main objectives, namely to yield inflation-adjusted annuity income over long post-retirement periods (**real income objective**), and the amount of legacy capital available when the plan would have been terminated at different points in a post-retirement period of thirty years (**legacy capital objective**).

In this final analysis, no fixed assumptions about portfolio returns are made, instead returns for each year of the post-retirement period are simulated given an expected real return (thus, returns above inflation) of 3.5% per annum, but with a standard deviation of 10% from the expected return. Inflation is assumed to be 6% per annum with a standard deviation of 1% from the mean. The simulation process is then repeated for initial drawdown rates ranging from 3%, 5% and 7% of retirement capital.

The objective of the simulation exercise is to develop a probability interval of possible outcomes for each drawdown rule, for example at the 50th percentile (median) 50% of the results were better or worse than shown. Thereby a better understanding is developed how to judge objectively each drawdown rule as opposed to a "constant variable value" analysis.

[1] A description of these rules appears in Appendix I

[2] The projected inflation and investment portfolio return assumptions appear in Appendix II

Analysis

Explanation of graphs and terminology

NB: All results are shown for the median outcome (50th percentile) of simulated results. See Appendix III for an indication of outcomes between the 25th and 75th percentiles.

"Withdrawal rate at period"

The withdrawal rate required (percentage) of capital available at period x of post-retirement phase, e.g. the withdrawal rate required to meet income demands in 15th year of post-retirement.

"Real income"

The ability of the rule to sustain inflation-adjusted income over the post-retirement phase, it is expressed as a percentage of initial annuity income at the onset of the retirement plan.

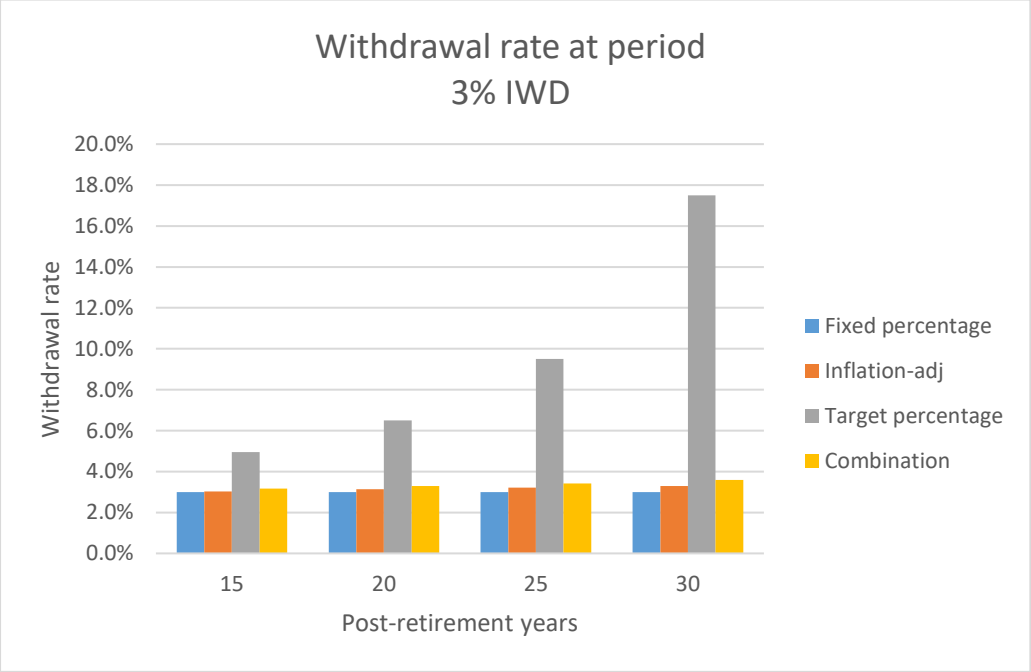
"Legacy capital as factor of initial capital"

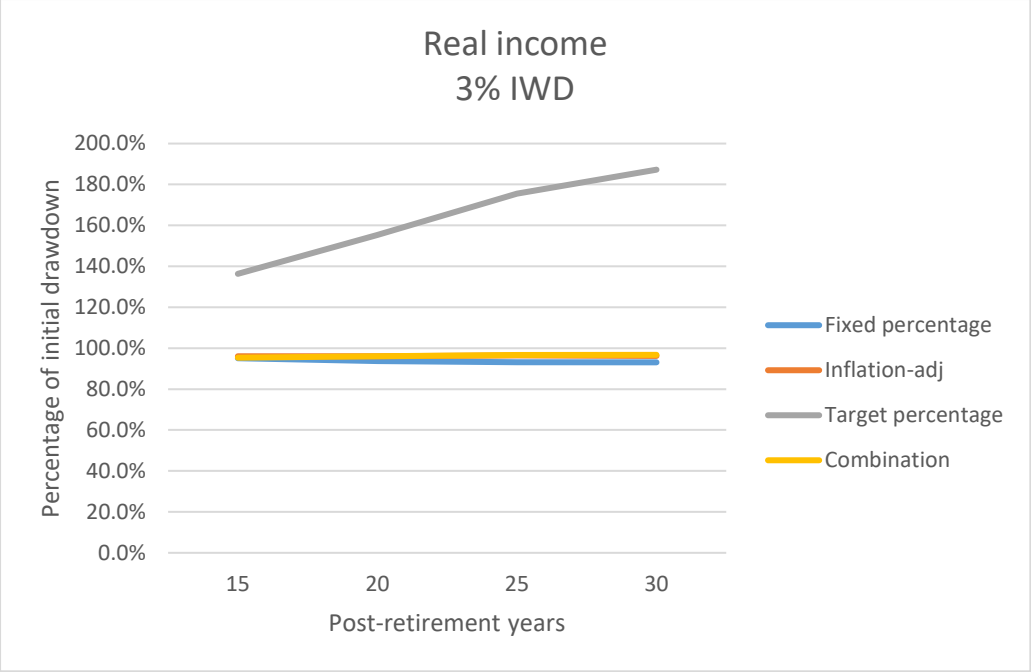
The value of retirement capital available at the end of various post-retirement periods, expressed in terms of a factor of initial retirement capital.

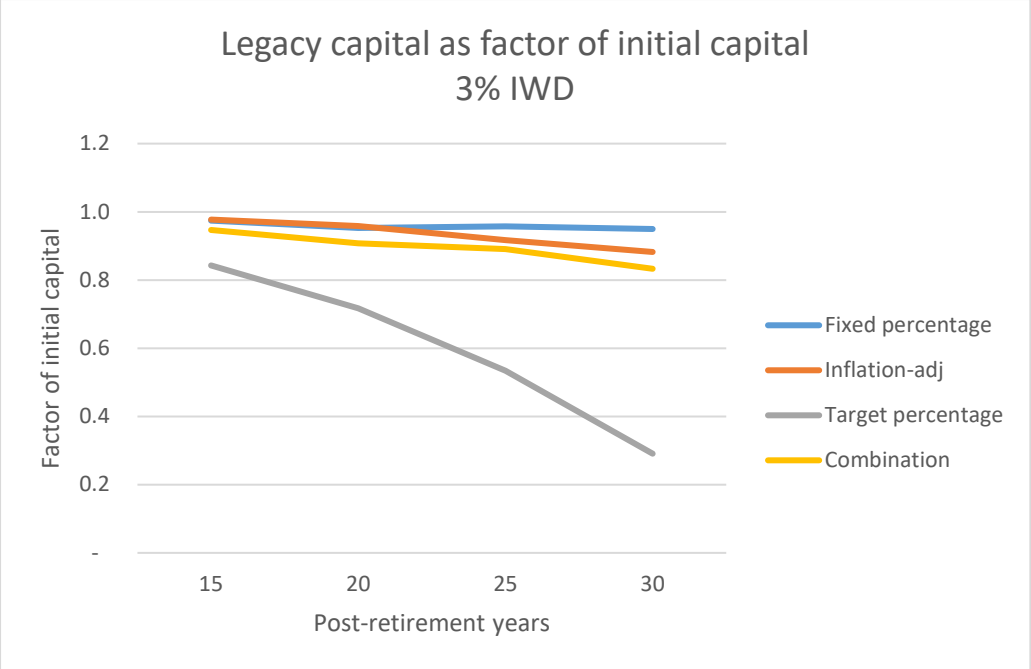
"Internal rate of return"

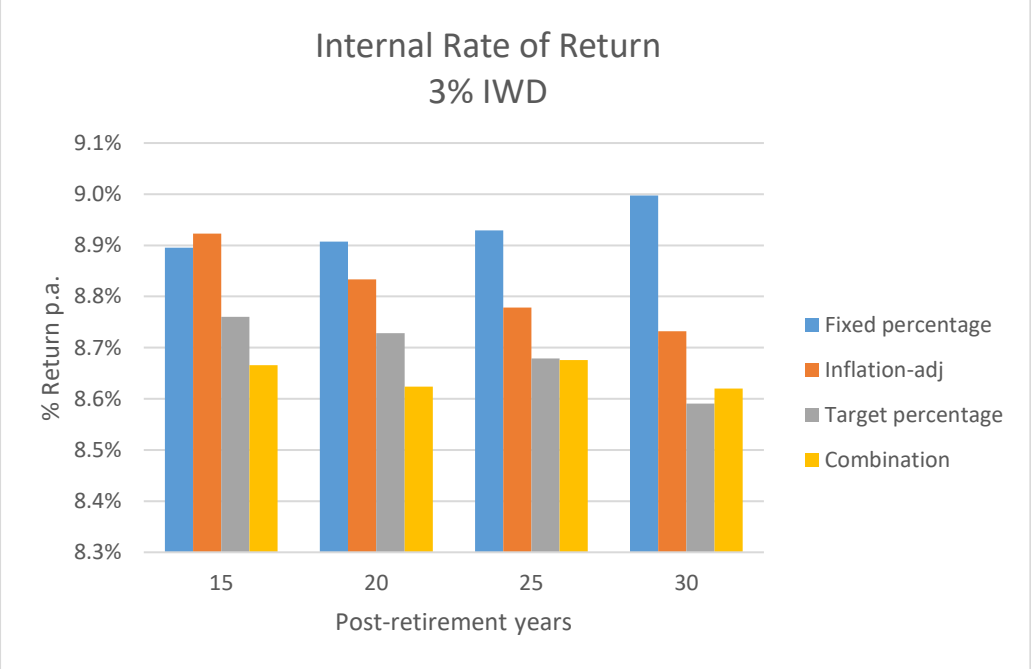
The internal rate of return for each rule is calculated by considering initial capital, annuity income paid over the period, and residue capital available at specific post-retirement periods. The rule with the highest internal rate of return has fared the best under the set of conditions stipulated. Note, however, it is only the "best" rule in the absence of any specific preference to maximise annuity income or legacy capital objectives.

Initial Drawdown Rate = 3% of retirement capital



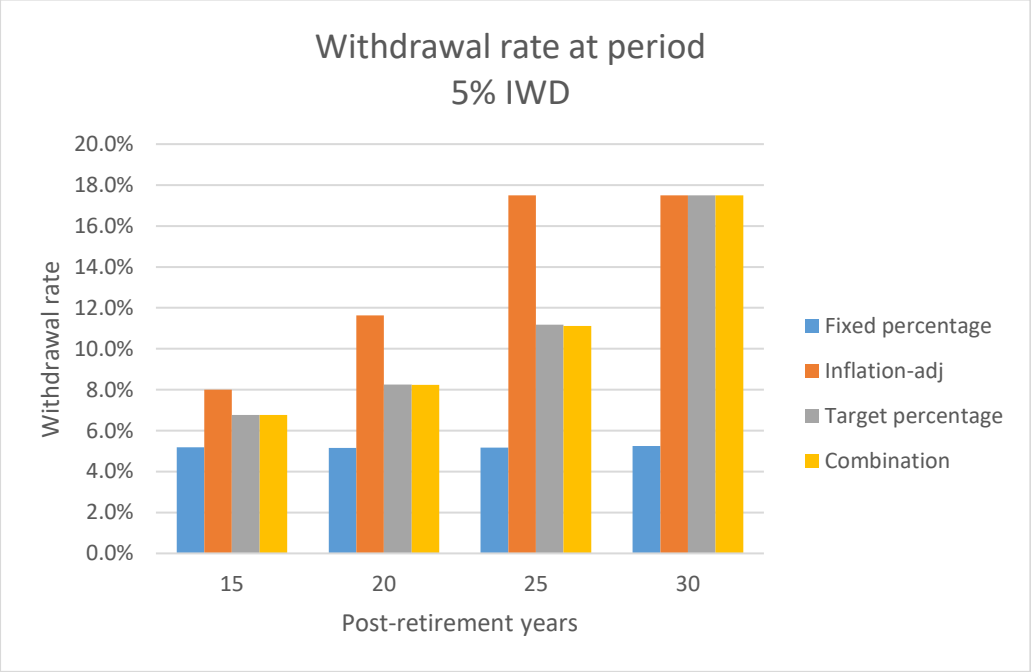


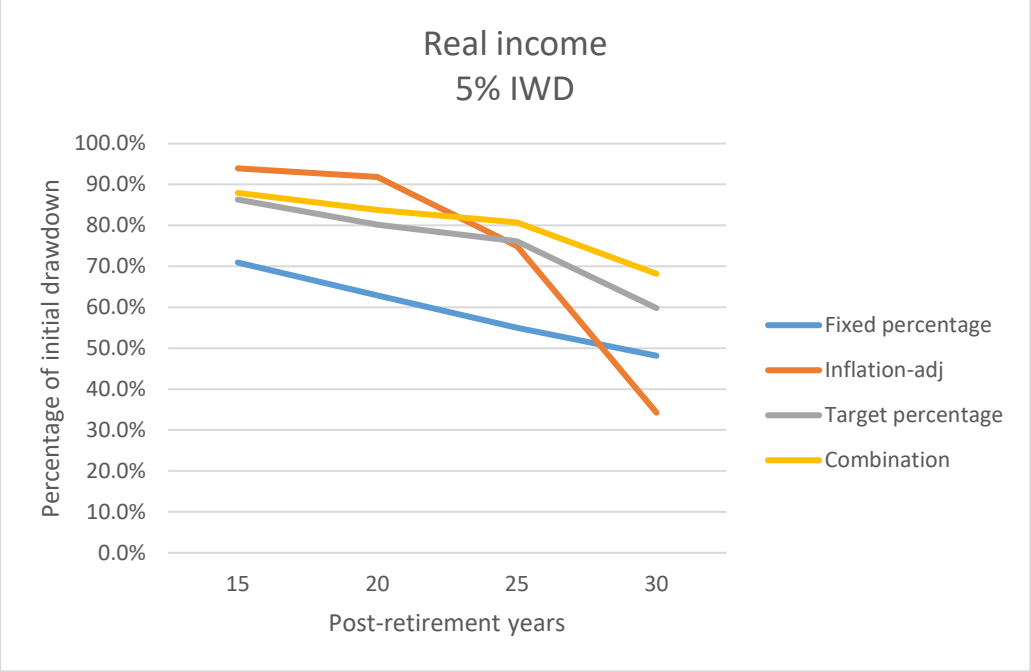


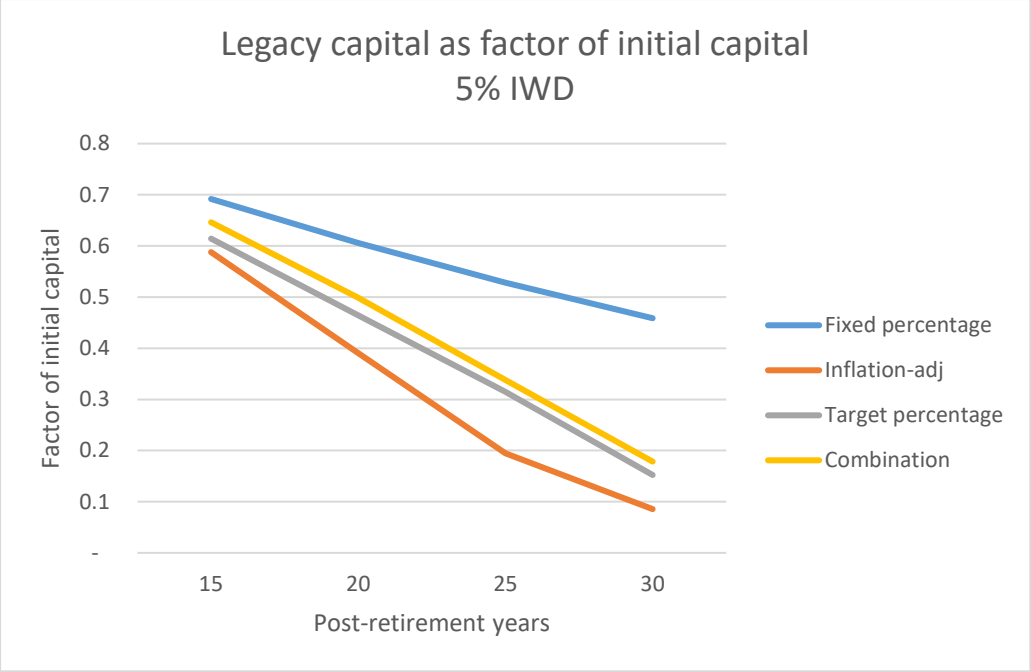


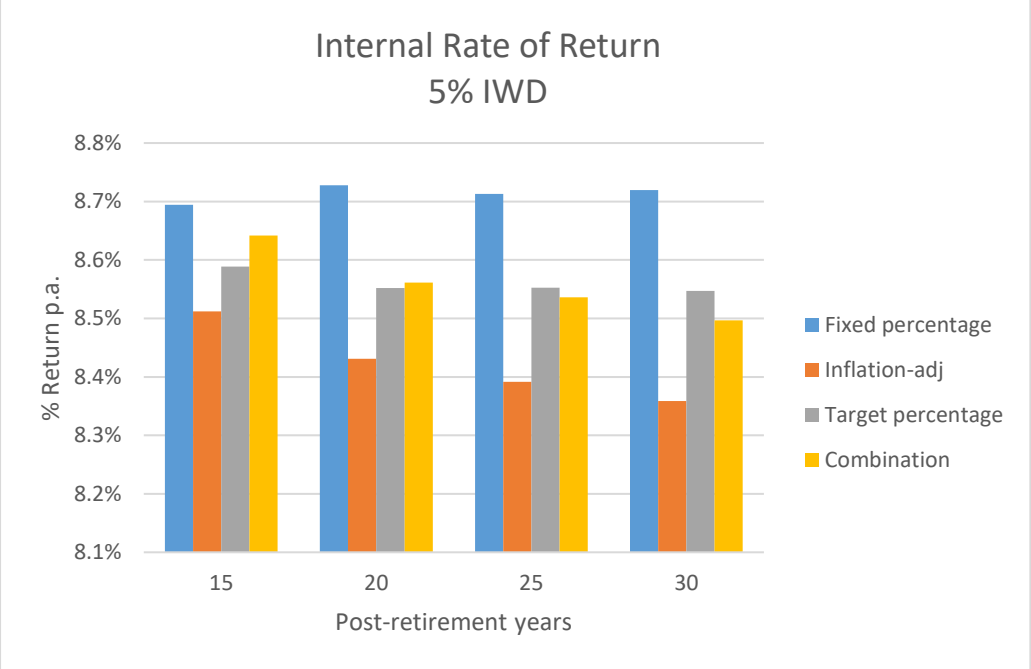
The *target percentage* rule yielded the highest real income, but also the least legacy capital relative to all the other rules. When no specific preference exists for either maximising annuity income or legacy capital, the *fixed percentage* rule has fared the best when evaluated over different post-retirement intervals.

Initial Drawdown Rate = 5% of retirement capital



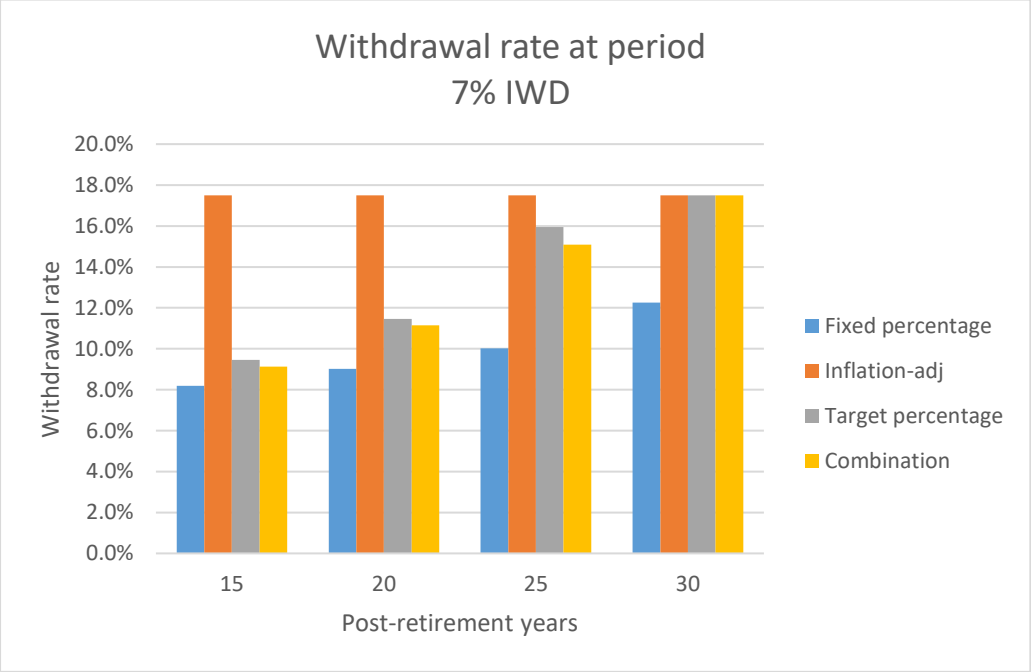


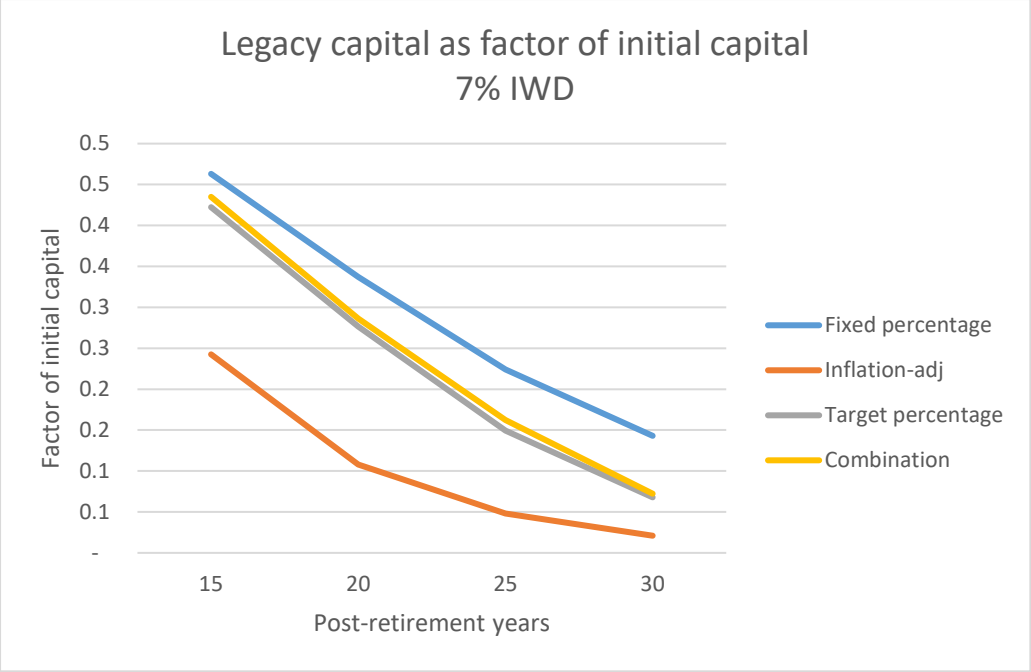


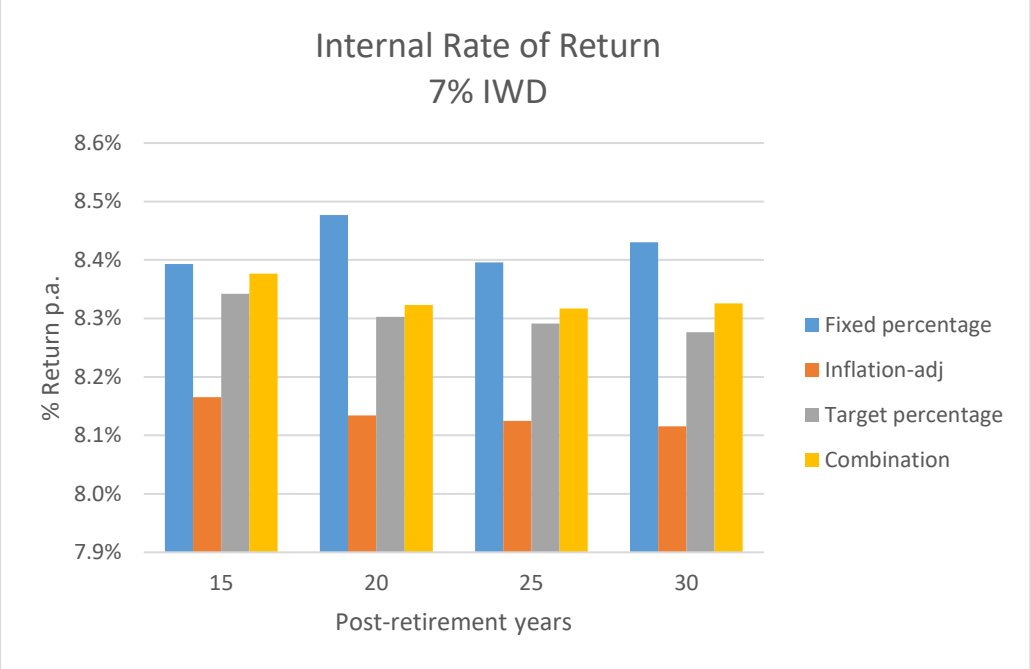


The *inflation-adjusted* rule initially delivered the highest real annuity income, but it tapered off quickly after 20 years, thereafter the *combination* and *target percentage* rules provided the highest annuity income. The *fixed percentage* rule yielded the highest amount of legacy capital, but perhaps not satisfactory annuity income over the different post-retirement periods. When no specific preference exists for either maximising annuity income or legacy capital, the *fixed percentage* rule has fared the best when evaluated over different post-retirement intervals.

Initial Drawdown Rate = 7% of retirement capital







The *inflation-adjusted* rule delivered initially the highest real annuity income, but it tapered off quickly after 15 years, thereafter the other rules provided more sustainable annuity income over longer post-retirement intervals. The *fixed percentage* rule yielded the highest amount of legacy capital, but at the expense of lower real annuity income than the other rules. When no specific preference exists for either maximising annuity income or legacy capital, the *fixed percentage* rule has fared the best when evaluated over different post-retirement intervals.

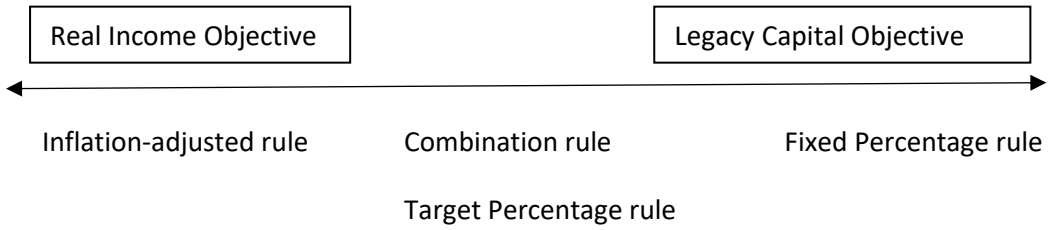
Synopsis

At low initial drawdown rates required (say 3%), the specific drawdown rule applied perhaps does not matter a great deal. The respective rules yielded approximately the same results – the only exception (in my specific analyses) would be the *target percentage* rule since the annual drawdown rate will be pre-determined by a specific drawdown target, and in this instance provided a much higher annuity income stream than the other rules. For most retirees categorised as low drawdown annuitants, legacy capital accumulation is probably more important than the real income objective, hence the *fixed percentage* rule should suffice.

Retirees, however, that will require an initial drawdown of 5% of retirement capital should place more emphasis on the real income objective while the legacy capital objective will become less important. The *inflation-adjusted*, *target percentage*, and the *combination* of the former rules are better suited to comply with these objectives than the *fixed percentage* rule.

Lastly, those retirees targeting a relatively high initial drawdown rate of 7%, thus focusing mostly on the real income objective, should consider the *target percentage* and its *combination* with the *inflation-adjusted* rules.

Diagrammatic presentation of preference for drawdown rule depending on objective



Appendix I

Fixed percentage

Each year the same withdrawal rate is selected, for example, 5% of retirement capital. The underlying performance of your investment portfolio plays a direct role in the income that will be available at review. Some overriding provisions, however, will apply – the income for the forthcoming year may not be less than the preceding year, i.e. it means if the income calculated (withdrawal rate x retirement capital value at start of review period) for the forthcoming year would be less than the previous year, an amount equal to that of the previous year will be elected and therefore this intervention will breach the fixed percentage rule. Furthermore, the income selected at review stage may never be less than 2.5% or exceed 17.5% of retirement capital.

Inflation-adjusted annuity income

Each year the previous year's annuity income and then adjusted by the prevailing inflation rate is selected, irrespective how your underlying investment portfolio performed. The income selected at review stage may never be less than 2.5% or exceed 17.5% of retirement capital, therefore this rule will be breached whenever any of these conditions will apply.

Target drawdown percentage

Income at review stage is selected based upon a pre-determined targeted withdrawal or drawdown rate (described below) and dependant on the remainder of the expected lifespan of the retirement plan. Investment portfolio performance will have a direct influence on the income amount available at review stage. Again, some overriding provisions to this rule will apply. The income of the forthcoming period may not be less than the preceding period. Furthermore, the income selected at review period may never be less than 2.5% or exceed 17.5% of retirement capital.

The pre-determined target drawdown rate is based on the maximum ("ceiling") percentage that can be withdrawn each year without jeopardising the long-term sustainability of the plan. Each year's target drawdown rate considers the remainder of the expected lifespan of the plan, i.e. life expectancy. More specifically, each year's escalation in the target rate will be such that the maximum withdrawal rate of 17.5% is only likely to be reached by the 30th year of the post-retirement plan.

For example, using a conservative portfolio return assumption of 8.5% p.a. over time, I calculated the following target drawdown percentages for each year of the post-retirement period, starting off with different initial drawdown rates at the inception of the plan.

Post-retirement period	Initial Drawdown Rate				
	3%	4%	5%	6%	7%
1	3.0%	4.0%	5.0%	6.0%	7.0%
2	3.1%	4.1%	5.1%	6.1%	7.1%
3	3.2%	4.2%	5.2%	6.1%	7.1%
4	3.3%	4.3%	5.2%	6.2%	7.2%
5	3.4%	4.4%	5.3%	6.3%	7.2%
6	3.5%	4.5%	5.4%	6.4%	7.3%
7	3.6%	4.6%	5.5%	6.5%	7.4%
8	3.7%	4.7%	5.6%	6.6%	7.5%
9	3.9%	4.8%	5.8%	6.7%	7.6%

Post-retirement period	Initial Drawdown Rate				
	3%	4%	5%	6%	7%
10	4.0%	5.0%	5.9%	6.8%	7.7%
11	4.2%	5.1%	6.0%	7.0%	7.8%
12	4.3%	5.3%	6.2%	7.1%	7.9%
13	4.5%	5.5%	6.4%	7.3%	8.0%
14	4.7%	5.7%	6.6%	7.4%	8.2%
15	5.0%	5.9%	6.8%	7.6%	8.4%
16	5.2%	6.2%	7.0%	7.9%	8.5%
17	5.5%	6.4%	7.3%	8.1%	8.8%
18	5.8%	6.7%	7.5%	8.4%	9.0%
19	6.1%	7.1%	7.9%	8.7%	9.2%
20	6.5%	7.4%	8.2%	9.0%	9.5%
21	6.9%	7.9%	8.7%	9.4%	9.9%
22	7.4%	8.4%	9.1%	9.9%	10.3%
23	8.0%	9.0%	9.7%	10.5%	10.7%
24	8.7%	9.6%	10.3%	11.1%	11.3%
25	9.5%	10.5%	11.1%	11.9%	11.9%
26	10.5%	11.4%	12.1%	12.8%	12.6%
27	11.7%	12.7%	13.2%	13.9%	13.6%
28	13.2%	14.2%	14.7%	15.4%	14.7%
29	15.2%	16.2%	16.6%	17.3%	16.1%
30	17.5%	17.5%	17.5%	17.5%	17.5%

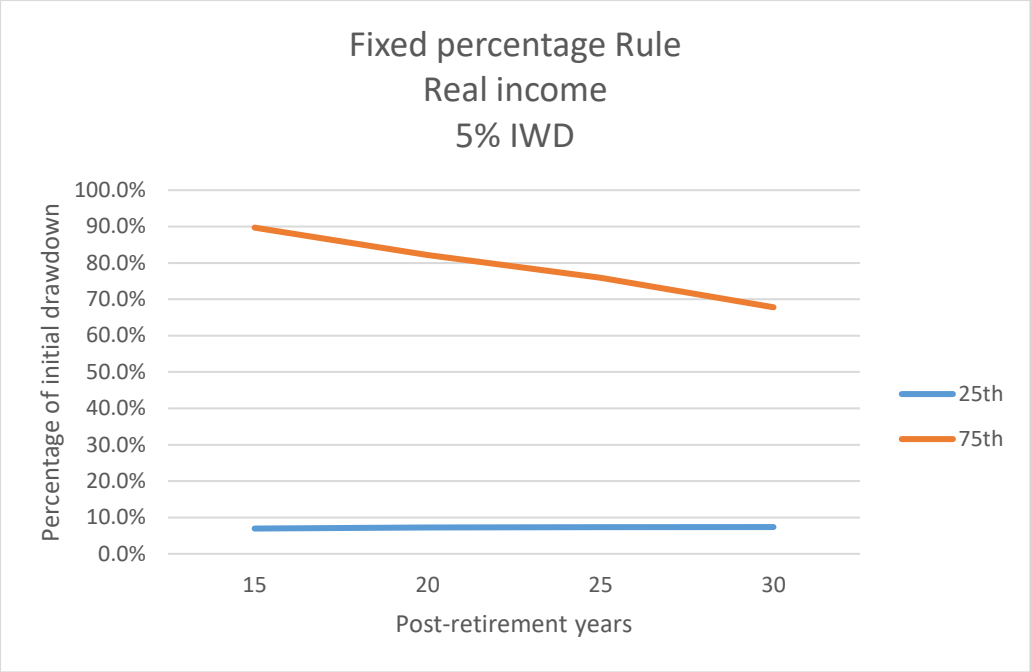
A combination of inflation-adjusted annuity income and target drawdown percentage

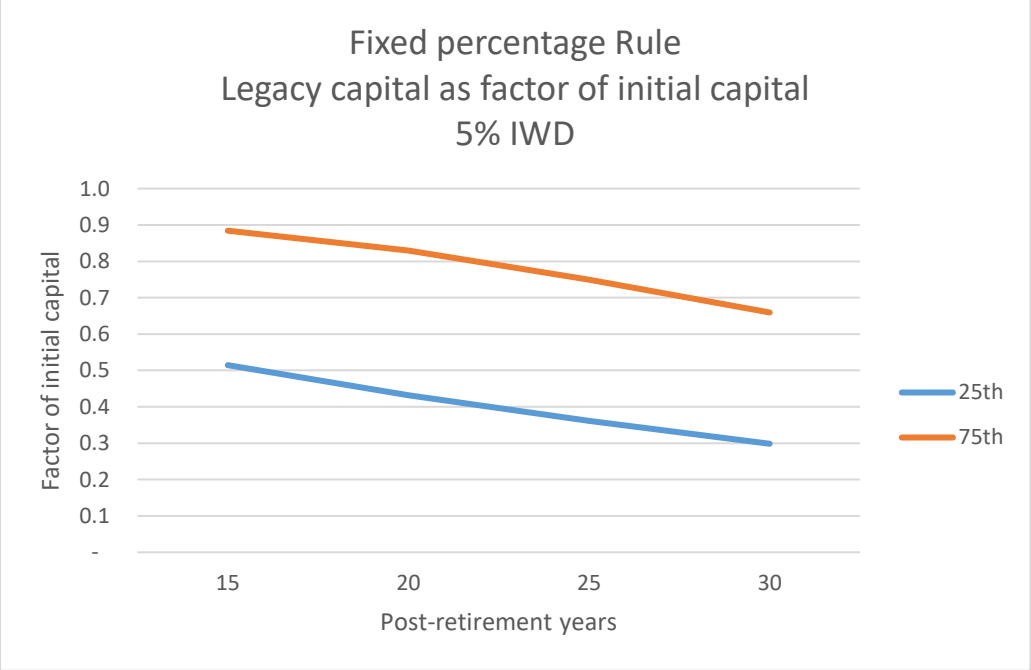
The same as the above (*target drawdown percentage*), but with an additional rule that the annual adjustment in income will not exceed the inflation-adjusted annuity income target. The latter target is like the *inflation-adjusted annuity income* rule. Thus, an escalation in income may not exceed that income as determined by the inflation-adjusted annuity income rule. Furthermore, the same overriding provisions as above will apply.

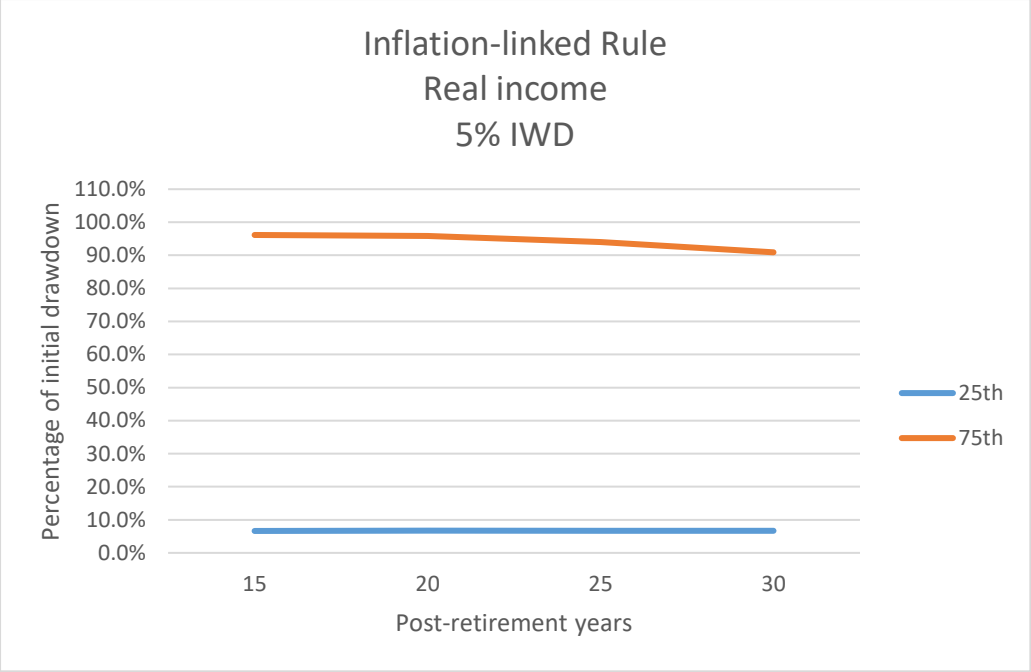
Appendix II

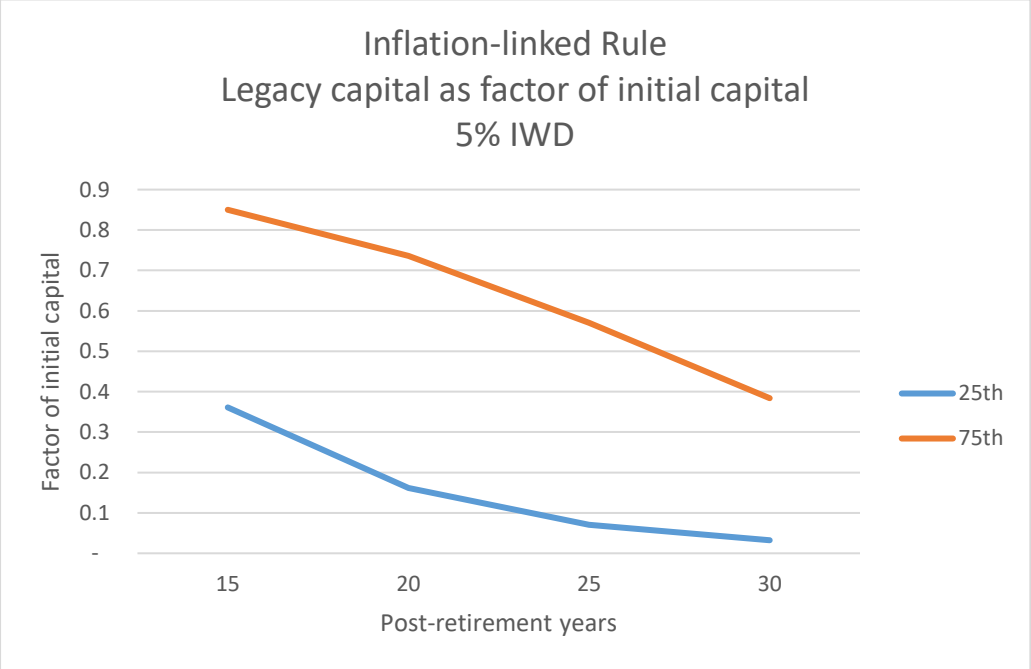
Post-retirement Period	Inflation rate	Nominal portfolio return
1	6.3%	4.2%
2	6.7%	16.9%
3	7.0%	4.0%
4	5.0%	12.3%
5	6.6%	26.8%
6	6.8%	18.5%
7	4.4%	2.3%
8	7.0%	-14.3%
9	5.0%	2.6%
10	8.0%	-5.6%
11	7.3%	22.1%
12	7.0%	4.1%
13	4.5%	18.5%
14	5.2%	20.1%
15	6.1%	20.8%
16	5.5%	7.2%
17	4.8%	9.3%
18	6.0%	-1.4%
19	3.4%	0.8%
20	5.9%	22.4%
21	6.1%	4.5%
22	4.6%	19.3%
23	4.0%	19.5%
24	6.0%	20.5%
25	5.1%	13.3%
26	4.4%	30.1%
27	6.1%	6.5%
28	6.0%	13.8%
29	6.0%	2.9%
30	5.6%	5.1%

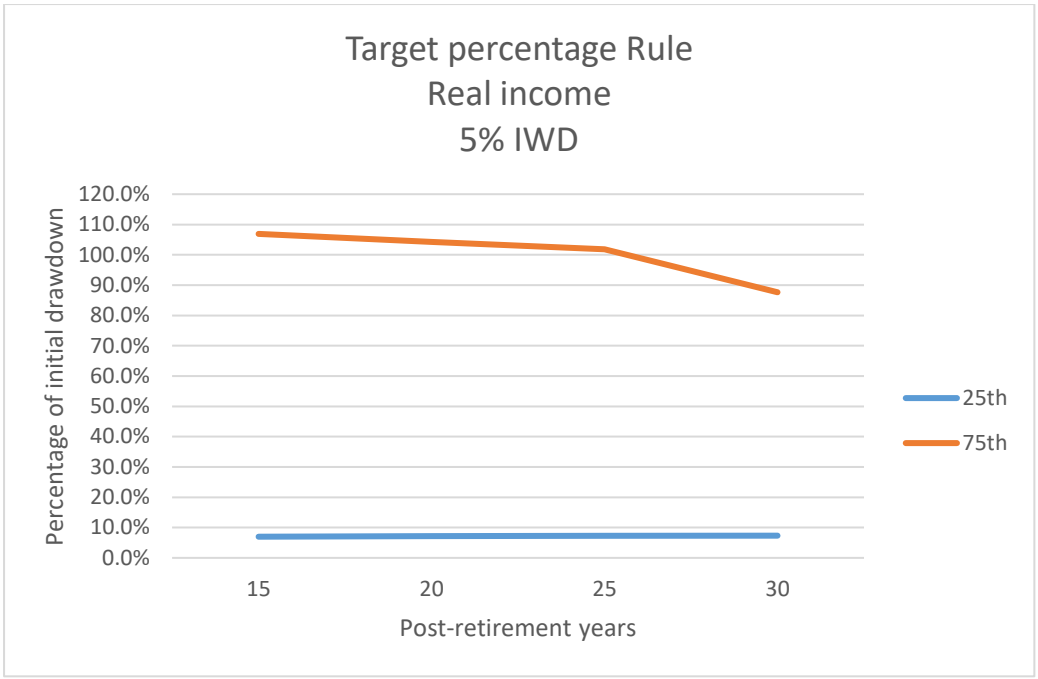
Appendix III

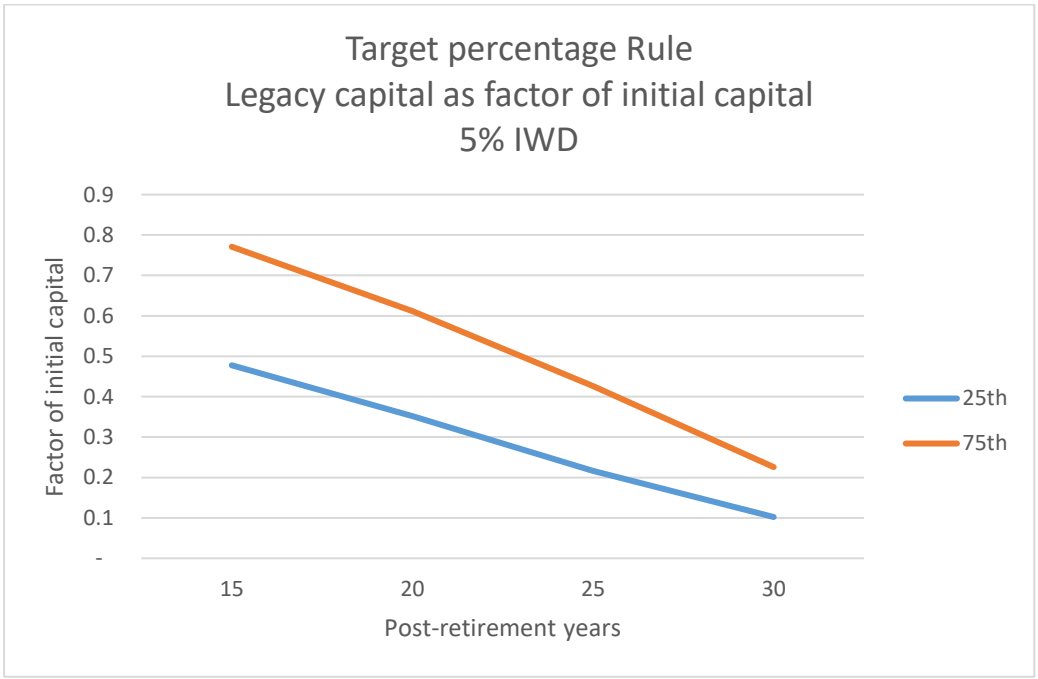




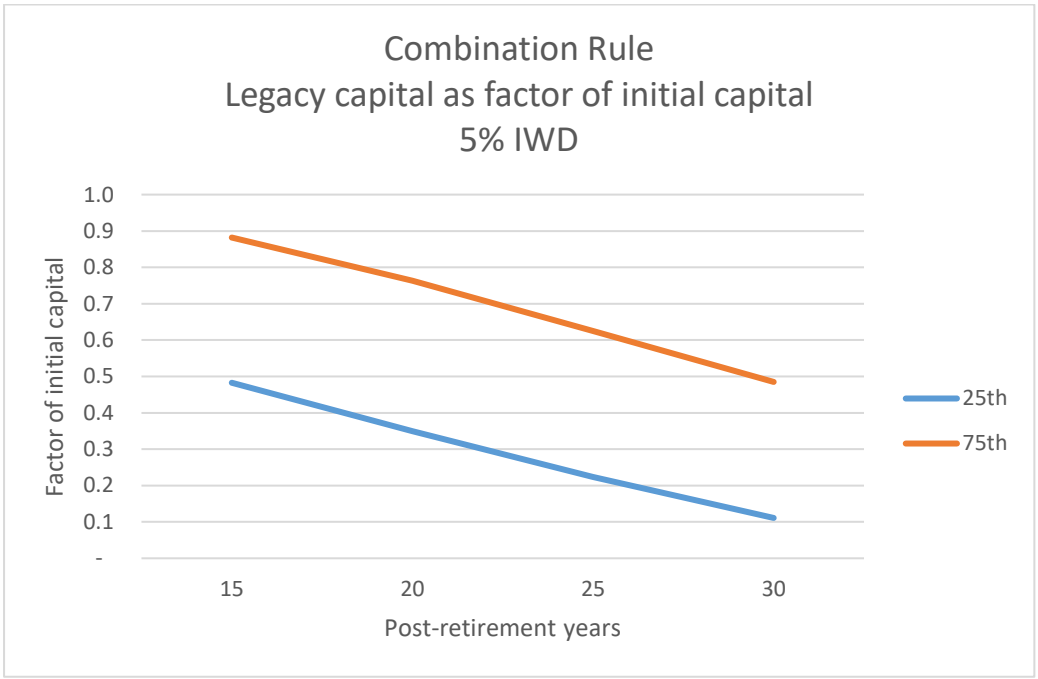

Inflation-linked Rule
Real income
5% IWD
Percentage of initial drawdown
110.0%
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
15
20
25
30
Post-retirement years
25th
75th


Inflation-linked Rule
Legacy capital as factor of initial capital
5% IWD
Factor of initial capital
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-
15
20
25
30
Post-retirement years
25th
75th


Target percentage Rule
Real income
5% IWD
Percentage of initial drawdown
120.0%
110.0%
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
15
20
25
30
Post-retirement years
25th
75th


Target percentage Rule
Legacy capital as factor of initial capital
5% IWD
Factor of initial capital
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-
15
20
25
30
Post-retirement years
25th
75th


Combination Rule
Real income
5% IWD
Percentage of initial drawdown
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
15
20
25
30
Post-retirement years
25th
75th


Combination Rule
Legacy capital as factor of initial capital
5% IWD
Factor of initial capital
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-
15
20
25
30
Post-retirement years
25th
75th