Variable Annuities:
Comparing the Step-up Reset Methods

A White Paper from Aftcast.com

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Executive Summary:

This study applies to variable annuities with guaranteed minimum withdrawal benefits for life (VA-GMWBL) during the withdrawal stage. Throughout this paper "guaranteed" means the income guarantees provided by the insurer and backed by the strength of the insurer alone.

For the purpose of this analysis, we assume that the step-ups are reviewed and possibly triggered at each anniversary of the purchase of the VA-GMWBL. This is the step-up trigger date.

A step-up of the GWB creates a higher income for the retiree for the rest of his/her life. In the universe of VA-GMWBL, there are currently two types of methods to step-up the guaranteed withdrawal base (GWB):

Lifetime High Reset: The first type of reset is based on lifetime high portfolio value. If the current portfolio market value (contract value) exceeds the GWB at the trigger date, then a step-up occurs. The GWB is increased to the same level as the portfolio market value.

Annual High Reset: With the second type of reset, the portfolio market value is compared to its value at the previous anniversary. If the current portfolio market value exceeds its previous value, then a step-up occurs. The GWB is increased by the same percentage as the portfolio market value since the last anniversary. This increase takes place even if the portfolio market value is lower than the GWB.

Summary of Findings:

The aftcast of all years since 1900 shows that:

- The annual high reset method provides a significantly higher number of step-up resets compared to lifetime high reset method.
- The guaranteed income that the annuitant receives with the annual high reset method over his life is higher than using the lifetime high reset method.
- With the annual high reset method, the resets continued to occur until older ages compared to lifetime high reset method.
- In all cases, the lower starting payments of the annual high reset method catch up with the higher payout of the lifetime high reset method and provide a higher cumulative income over the average life expectancy.

Introduction:

As baby boomers face the fear of outliving their savings, sales of VA-GMWBL increased considerably until the 2008 market crash. After that, many investors and advisors held back their purchases until some clarity developed in the credit markets. Many insurers pulled their VA guarantees off the market, or changed them to reduce their exposure to risk.

While some people consider VA-GMWBLs expensive, they do help reduce the fear of running out of income while preserving the hope of retaining assets for emergencies or for the next generation.

There are three broad categories of financial risk factors during retirement: longevity risk (living too long), market risk (premature portfolio depletion) and purchasing power risk (inflation). Most VA-GMWBL products, when properly selected, eliminate the first two risk factors. They provide a guaranteed lifelong income regardless of what happens to the investment side of the contract.

It is the third risk factor – the inflation- where VA-GMWBLs have a shortfall. This is where there is room for improvement. When we look at the historical outcomes, in the vast majority of cases, the step-up resets do not provide pay increases sufficient to maintain the retiree's purchasing power. This is where the type of step-up reset methodology can make a significant difference for mitigating the inflation risk.

A VA-GMWBL has two balances to keep track of: The first one is the market value, which fluctuates just like any investment portfolio. This is called the Contract Value (CV). The second balance to keep track of is the GWB. It is used to calculate the income payments, which are a percentage of the GWB.

The day you buy the VA-GMWBL, both the CV and the GWB have the same value. Over time, the CV generally decreases because withdrawals by the retiree (income) and the insurer (portfolio expenses and riders) are paid from it. Subsequently, even if the CV might go down to zero, the annual payments continue seamlessly for life, because of the guarantees provided by the insurance company.

Aftcast of 1943:

We now review an aftcast of a few selected years. We first start with the year 1943 and compare the two types of step-up methods.

Lifetime High Reset - 1943:

A step-up can occur only if the CV makes a new high. As time goes on, it becomes harder and harder for the retiree to experience further step-ups because of the adverse effects of time value of fluctuations[1].

Let's work thorough an example: Bob, 65, is just retiring. He buys a VA-GMWBL for $100,000 that guarantees 5% withdrawal between ages 65 and 79. After age 79, the payments are the higher of either A. the then current withdrawals, or B. 6% of the CV, until death.

Bob's contract allows him annual step-ups using the lifetime high reset method. The asset mix is 60% DJIA and 40% fixed income. Assume total costs of this contract – including management costs and portfolio costs, are 2.6% of the CV. The cost of the GMWBL rider is 1.05% of the GWB. Both of these costs are taken from the portfolio as long as there is sufficient money to cover them. When and if the portfolio runs out of money, these charges cease to exist and no additional fees or charges are paid by him.

Let's assume Bob retired at the beginning of 1943. Figure 1 shows the results. Table 1 shows the figures for each age until age 90.

[1] See Otar, Jim, *Unveiling the Retirement Myth*, ISBN 978-0-9689634-2-5, 2009: Here, the time value of fluctuations is the net effect of adverse sequence of returns, inflation and reverse dollar-cost-averaging that reduces the life of a distribution portfolio.

Figure 1: The effect of lifetime high resets, retiring at the beginning of 1943

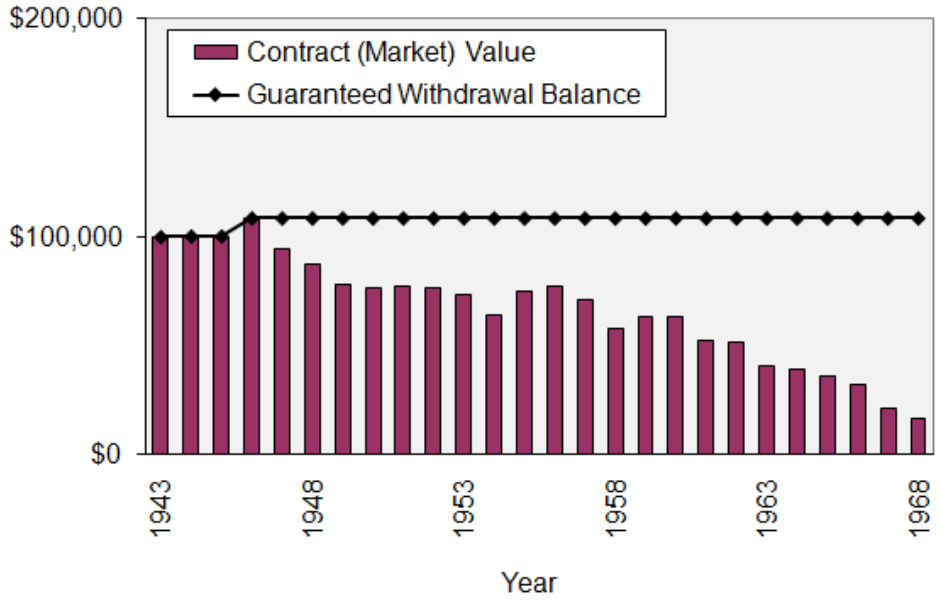


Table 1: The effect of lifetime high resets, retiring at the beginning of 1943

Age	Year	GWB	CV	Payment
65	1943	$100,000	$100,000	$5,000
66	1944	$100,312	$100,312	$5,016
67	1945	$100,312	$99,870	$5,016
68	1946	$108,578	$108,578	$5,429
69	1947	$108,578	$94,305	$5,429
70	1948	$108,578	$87,282	$5,429
71	1949	$108,578	$77,989	$5,429
72	1950	$108,578	$76,556	$5,429
73	1951	$108,578	$77,288	$5,429
74	1952	$108,578	$76,731	$5,429
75	1953	$108,578	$73,291	$5,429
76	1954	$108,578	$64,023	$5,429
77	1955	$108,578	$74,745	$5,429
78	1956	$108,578	$76,987	$5,429
79	1957	$108,578	$70,783	$5,429
80	1958	$108,578	$57,875	$5,429
81	1959	$108,578	$63,456	$5,429
82	1960	$108,578	$63,179	$5,429
83	1961	$108,578	$52,430	$5,429
84	1962	$108,578	$51,758	$5,429
85	1963	$108,578	$40,997	$5,429
86	1964	$108,578	$38,791	$5,429
87	1965	$108,578	$35,839	$5,429
88	1966	$108,578	$31,794	$5,429
89	1967	$108,578	$20,986	$5,429
90	1968	$108,578	$16,831	$5,429

The portfolio made new highs at age 66 (1944) and 68 (1946), reaching $108,578. After age 68, Bob's income was $5,429, which is 5% of $108,578, for life. At age 90, Bob received the same income as he did at age 68.

Let's compare this with the annual high reset method.

Annual High Reset - 1943:

With this method, the CV does not need to exceed the GWB ever to trigger a step-up. Even if the portfolio value is only a small fraction of its initial amount than last year, you might still get a pay raise.

Going back to Bob's example, he buys a VA-GMWBL for $100,000 that guarantees a 4.5% withdrawal between ages 65 and 80. After age 80, the payments are the higher of either A. the then current withdrawals, or B. 5.5% of the CV, until death.

In this case, Bob's contract allows him step-ups using the annual high reset method. The asset mix and the costs are exactly the same as before.

Figure 2 shows the effect of annual high reset. Each time the CV was higher than the previous year; it created a step-up by the exact same percentage growth. The final reset occurred at age 81, in the year 1959, and the guaranteed withdrawal base was set to $147,822. Bob's income after age 81 was $6,652.

In a distribution portfolio, fluctuations are normally the foe. However, with the annual high reset method, portfolio fluctuations help create significant pay raises for the retiree.

Figure 2: The effect of annual high resets, retiring at the beginning of 1943

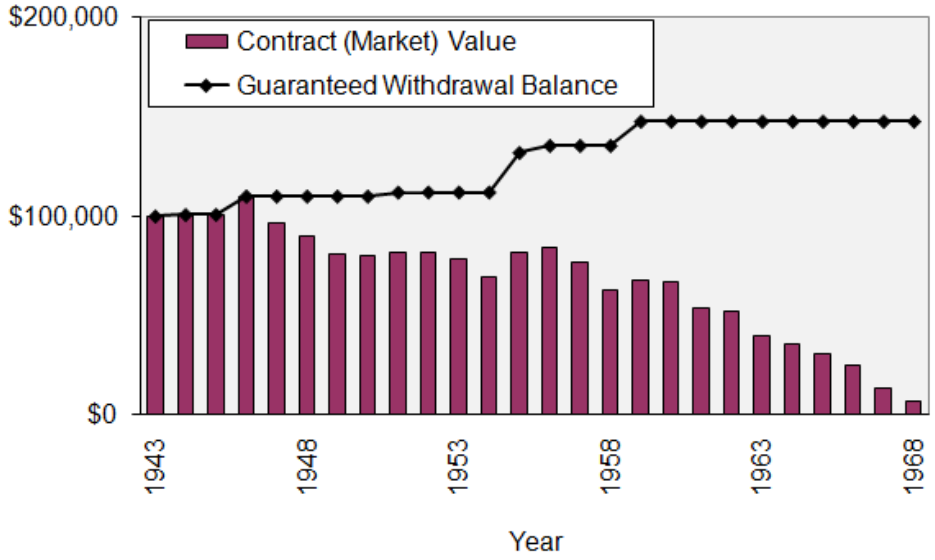


Table 2: The effect of annual high resets, retiring at the beginning of 1943

Age	Year	GWB	CV	Payment
65	1943	$100,000	$100,000	$4,500
66	1944	$100,812	$100,812	$4,537
67	1945	$100,844	$100,844	$4,538
68	1946	$110,093	$110,093	$4,954
69	1947	$110,093	$96,209	$4,954
70	1948	$110,093	$89,638	$4,954
71	1949	$110,093	$80,748	$4,954
72	1950	$110,093	$79,916	$4,954
73	1951	$112,088	$81,363	$5,044
74	1952	$112,160	$81,416	$5,047
75	1953	$112,160	$78,483	$5,047
76	1954	$112,160	$69,394	$5,047
77	1955	$132,055	$81,703	$5,942
78	1956	$135,617	$83,907	$6,103
79	1957	$135,617	$76,779	$6,103
80	1958	$135,617	$62,359	$6,103
81	1959	$147,822	$67,971	$6,652
82	1960	$147,822	$66,534	$6,652
83	1961	$147,822	$53,870	$6,652
84	1962	$147,822	$51,834	$6,652
85	1963	$147,822	$39,342	$6,652
86	1964	$147,822	$35,462	$6,652
87	1965	$147,822	$30,702	$6,652
88	1966	$147,822	$24,782	$6,652
89	1967	$147,822	$12,998	$6,652
90	1968	$147,822	$6,590	$6,652

Aftcast of 1946:

Let's move Bob's retirement age three years forward and see what happens. Assume he is retiring at the beginning of 1946 instead of 1943.

Lifetime High Reset - 1946:

Figure 3 and Table 3 show the results of the aftcast for the lifetime high reset method. We observe that there were no step-ups at all. The annual payments remained constant $5,000 throughout Bob's life. In this case, there was no inflation protection at all.

There is money available in the portfolio for additional withdrawals. However, Bob were to try to withdraw more than the guaranteed amount, then his guarantees would diminish, or more likely, disappear altogether.

Figure 3: The effect of lifetime high resets, retiring at the beginning of 1946

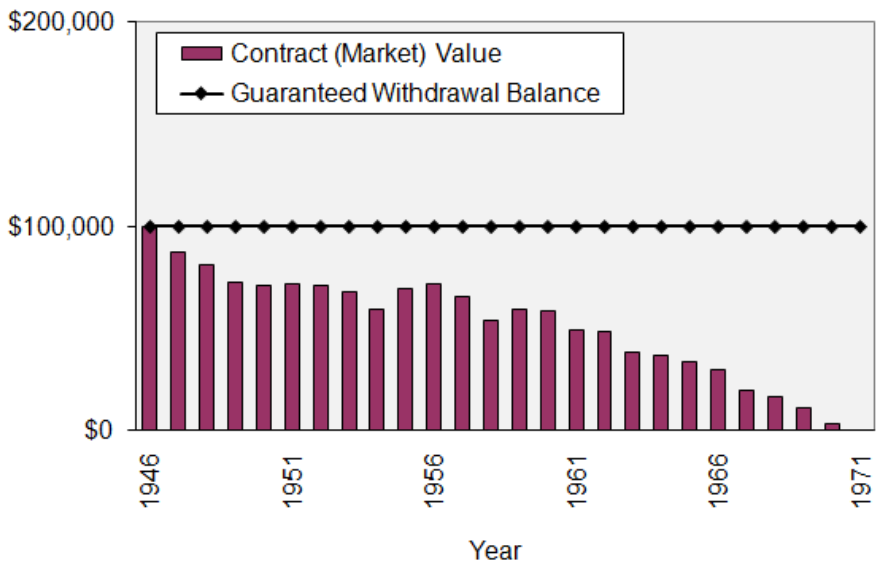


Table 3: The effect of lifetime high resets, retiring at the beginning of 1946

Age	Year	GWB	CV	Payment
65	1946	$100,000	$100,000	$5,000
66	1947	$100,000	$87,168	$5,000
67	1948	$100,000	$80,698	$5,000
68	1949	$100,000	$72,130	$5,000
69	1950	$100,000	$70,830	$5,000
70	1951	$100,000	$71,532	$5,000
71	1952	$100,000	$71,045	$5,000
72	1953	$100,000	$67,891	$5,000
73	1954	$100,000	$59,341	$5,000
74	1955	$100,000	$69,310	$5,000
75	1956	$100,000	$71,426	$5,000
76	1957	$100,000	$65,715	$5,000
77	1958	$100,000	$53,784	$5,000
78	1959	$100,000	$59,015	$5,000
79	1960	$100,000	$58,813	$5,000
80	1961	$100,000	$48,875	$5,000
81	1962	$100,000	$48,315	$5,000
82	1963	$100,000	$38,357	$5,000
83	1964	$100,000	$36,382	$5,000
84	1965	$100,000	$33,717	$5,000
85	1966	$100,000	$30,034	$5,000
86	1963	$100,000	$19,995	$5,000
87	1964	$100,000	$16,229	$5,000
88	1965	$100,000	$10,780	$5,000
89	1966	$100,000	$3,452	$5,000
90	1967	$100,000	$0	$5,000

Annual High Reset - 1946:

For the same starting year, 1946, the annual high reset method triggered five step-ups, as seen in Figure 4. These resets occurred while the CV *never* exceeded the original $100,000 invested. The final reset occurred at age 78 (1959), when his annual guaranteed payments reached $6,053 and remained constant after that.

Figure 4: The effect of annual high resets, retiring at the beginning of 1946

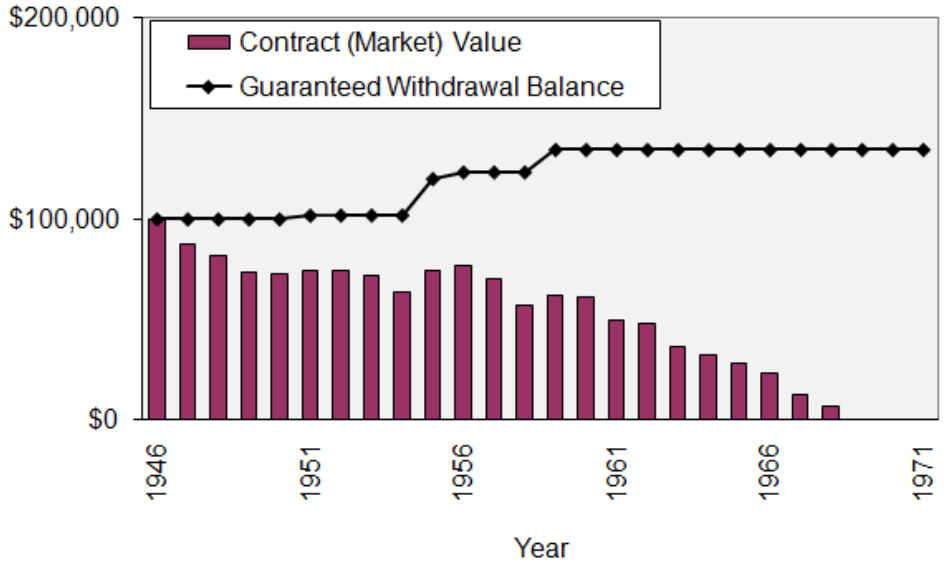


Table 4: The effect of annual high resets, retiring at the beginning of 1946

Age	Year	GWB	CV	Payment
65	1946	$100,000	$100,000	4500
66	1947	$100,000	$87,668	$4,500
67	1948	$100,000	$81,698	$4,500
68	1949	$100,000	$73,615	$4,500
69	1950	$100,000	$72,876	$4,500
70	1951	$101,839	$74,216	$4,583
71	1952	$101,934	$74,285	$4,587
72	1953	$101,934	$71,631	$4,587
73	1954	$101,934	$63,360	$4,587
74	1955	$120,048	$74,620	$5,402
75	1956	$123,332	$76,661	$5,550
76	1957	$123,332	$70,180	$5,550
77	1958	$123,332	$57,036	$5,550
78	1959	$134,504	$62,203	$6,053
79	1960	$134,504	$60,927	$6,053
80	1961	$134,504	$49,381	$6,053
81	1962	$134,504	$47,566	$6,053
82	1963	$134,504	$36,170	$6,053
83	1964	$134,504	$32,674	$6,053
84	1965	$134,504	$28,376	$6,053
85	1966	$134,504	$23,016	$6,053
86	1963	$134,504	$12,241	$6,053
87	1964	$134,504	$6,448	$6,053
88	1965	$134,504	$0	$6,053
89	1966	$134,504	$0	$6,053
90	1967	$134,504	$0	$6,053

Aftcast of 1983:

This analysis would be incomplete if we don't review the most recent 25 years of market history. We compare the two different reset methods if Bob were to retire at the beginning of 1983, just about the start of the final secular bullish trend of the 20th century.

Lifetime High Reset - 1983:

Figure 5 and Table 5 show the aftcast using the lifetime high reset method starting in 1983.

Figure 5: The effect of lifetime high resets, retiring at the beginning of 1983

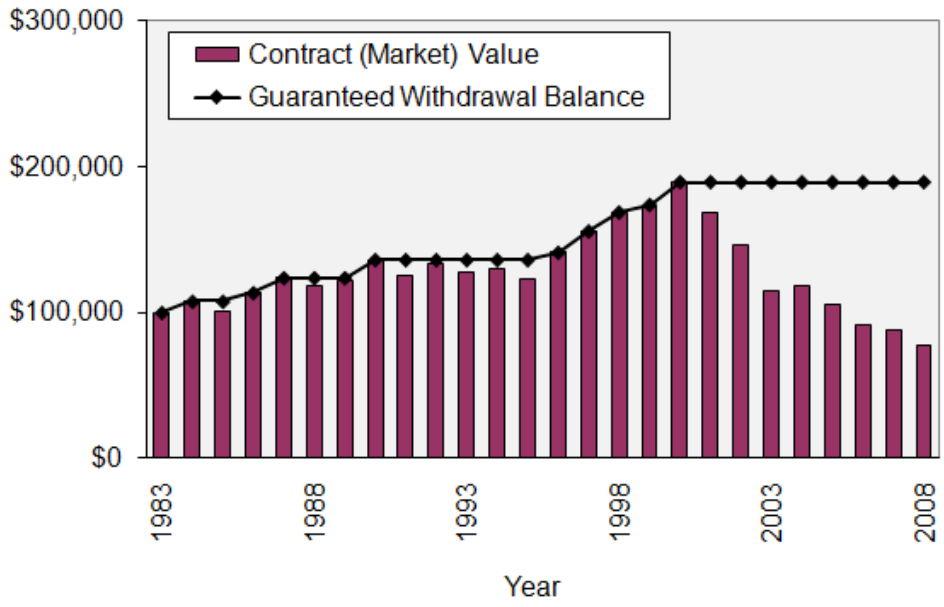


Table 5: The effect of lifetime high resets, retiring at the beginning of 1983

Age	Year	GWB	CV	Payment
65	1983	$100,000	$100,000	$5,000
66	1984	$107,658	$107,658	$5,383
67	1985	$107,658	$101,145	$5,383
68	1986	$113,524	$113,524	$5,676
69	1987	$123,628	$123,628	$6,181
70	1988	$123,628	$118,447	$6,181
71	1989	$123,628	$121,029	$6,181
72	1990	$135,948	$135,948	$6,797
73	1991	$135,948	$125,539	$6,797
74	1992	$135,948	$133,666	$6,797
75	1993	$135,948	$127,981	$6,797
76	1994	$135,948	$129,656	$6,797
77	1995	$135,948	$122,889	$6,797
78	1996	$140,942	$140,942	$7,047
79	1997	$155,457	$155,457	$7,773
80	1998	$168,277	$168,277	$10,097
81	1999	$173,377	$173,377	$10,403
82	2000	$188,890	$188,890	$11,333
83	2001	$188,890	$168,746	$11,333
84	2002	$188,890	$146,326	$11,333
85	2003	$188,890	$114,818	$11,333
86	2004	$188,890	$118,471	$11,333
87	2005	$188,890	$105,770	$11,333
88	2006	$188,890	$91,199	$11,333
89	2007	$188,890	$87,571	$11,333
90	2008	$188,890	$77,772	$11,333

During the last secular bullish trend of the 20th century, the lifetime high reset method provided a payment stream that exceeded inflation. It also created a sizable estate.

Annual High Reset - 1983:

Now, let's look at the annual-high reset method, as depicted in Figure 6 and Table 6.

Figure 6: The effect of annual high resets, retiring at the beginning of 1983

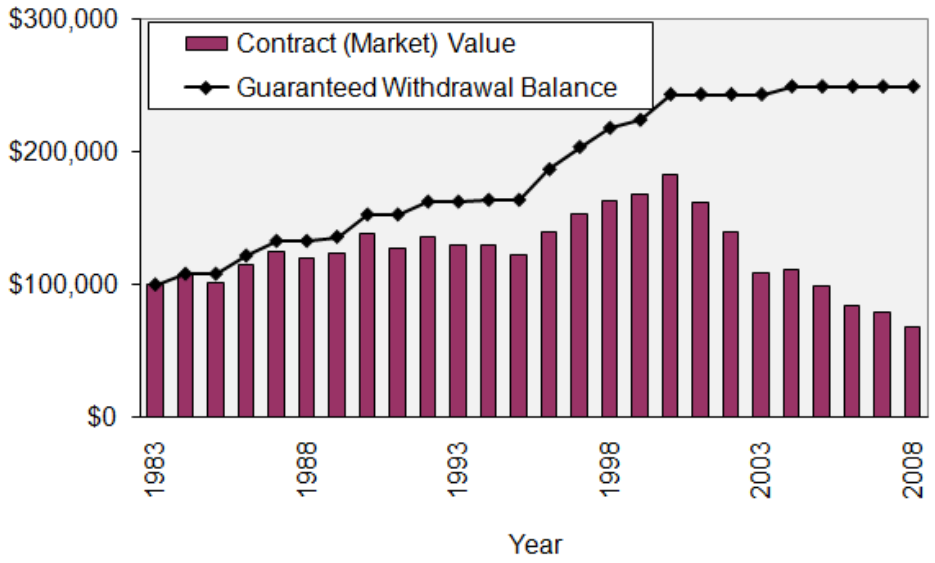


Table 6: The effect of annual high resets, retiring at the beginning of 1983

Age	Year	GWB	CV	Payment
65	1983	$100,000	$100,000	$4,500
66	1984	$108,158	$108,158	$4,867
67	1985	$108,158	$102,155	$4,867
68	1986	$121,898	$115,133	$5,485
69	1987	$132,870	$125,496	$5,979
70	1988	$132,870	$120,449	$5,979
71	1989	$135,996	$123,283	$6,120
72	1990	$152,776	$138,495	$6,875
73	1991	$152,776	$127,793	$6,875
74	1992	$162,532	$135,953	$7,314
75	1993	$162,532	$129,516	$7,314
76	1994	$163,825	$130,546	$7,372
77	1995	$163,825	$122,926	$7,372
78	1996	$186,894	$140,236	$8,410
79	1997	$203,751	$152,885	$9,169
80	1998	$218,080	$163,637	$9,814
81	1999	$224,141	$168,184	$10,086
82	2000	$243,422	$182,652	$10,954
83	2001	$243,422	$162,539	$10,954
84	2002	$243,422	$140,259	$10,954
85	2003	$243,422	$109,302	$10,954
86	2004	$249,360	$111,969	$11,221
87	2005	$249,360	$98,712	$11,221
88	2006	$249,360	$83,695	$11,221
89	2007	$249,360	$78,825	$11,221
90	2008	$249,360	$68,188	$11,221

The annual high reset method created a payment stream that is slightly lower than that of the lifetime high reset method.

Keep in mind that each case is different. These three examples allowed us to study the withdrawal characteristics in three different regimes of sequence of returns. In all cases the annual high reset method provided either a higher income (1943 and 1946), or a similar level of income (1983) for Bob.

Aftcast for all Years since 1900:

We apply the same procedure and calculate the aftcast for all years of retirement starting in 1900. Table 7 shows the historical statistics for each reset method.

- The median number of pay increases (step-ups) for the annual high reset method was five. This is significantly higher than the median number of pay increases of the lifetime high reset method, which is one.
- 34% of the time the lifetime high reset method experienced no pay increases. The annual high reset method always had a pay increase.
- Even though the starting withdrawal amount using the annual high reset method was 10% lower than using the lifetime high reset method ($4,500 versus $5,000), the annual high reset method provided a significantly higher income for the median, bottom decile and top-decile outcomes at age 85.

Table 7: Historical statistics comparing the two different reset methods

	Annual High Step-up Reset	Lifetime High Step-up Reset
Median Number of Step-ups	5	1
Probability of a "never" Step-up	0%	34%
Median annual income at age 85	$6,694	$5,282
Top-decile annual income at age 85	$8,816	$7,122
Bottom-decile annual income at age 85	$5,197	$5,000

Figure 7 depicts the median age of the last step up reset and corresponding median income from the VA-GMWBL including all retirement years since 1900.

The smaller circle (dark red) is for the lifetime high reset method. It indicates that a person who retired at age 65, had a 50% chance that his final pay increase was at age 66 with a median annual income of $5,247.

The larger circle (green) is for the annual high method. It indicates that a person who retired at age 65, had a 50% chance that his final pay increase was at age 75 with a median annual income of $6,680.

Figure 7: The median age of the final step-up reset and the corresponding median payment from the VA-GMWBL.

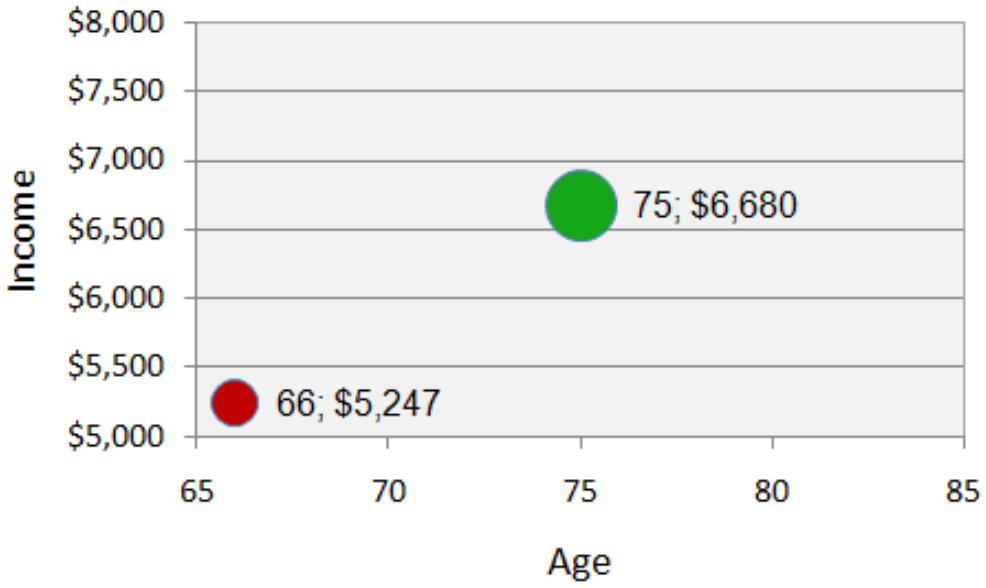


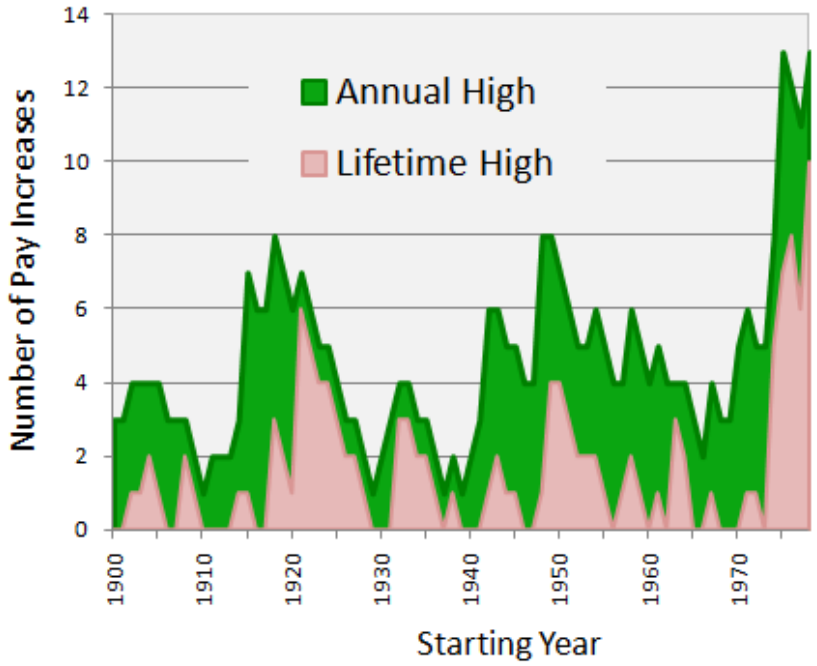
Figure 8 shows the number of resets (pay increases) that a retiree would have experienced for each of the retirement years since 1900.

The average number of pay increases using the annual high reset method was 4.6.

The average number of pay increases using the lifetime high reset method was 1.6.

The VA-GMWBL with annual high resets is an important income class in the advisor's tool box. It can create better inflation protection for the retiree.

Figure 8: The historical number of pay increases



The Breakeven Age of Payment Streams:

In all examples above using the annual high reset method, the payments start at 4.5% (of GWB) at age 65. On the other hand, in all examples using the lifetime high reset method, the payments start at 5% at age 65.

One might want to know if there is a breakeven age after which the annual payments using the annual high reset method are higher than payments using the lifetime high reset method.

Looking at averages, our analysis shows that after a number of years, the payments using the annual high reset method exceeded the payments using the lifetime high reset method. The age at which this breakeven point is reached depends on what average we are looking at.

Going back to Bob's example, if we look at the historical average income since 1900, the breakeven age was 70. If we look at the bottom decile income (bottom 10%), the breakeven age was 75. For the top decile income (top 10%), the breakeven age was 69.

In the vast majority of historical cases, payments provided by the annual high reset method paid a higher cumulative income over the typical retirement time horizon.

Figure 9: The breakeven age for payments for the average outcome

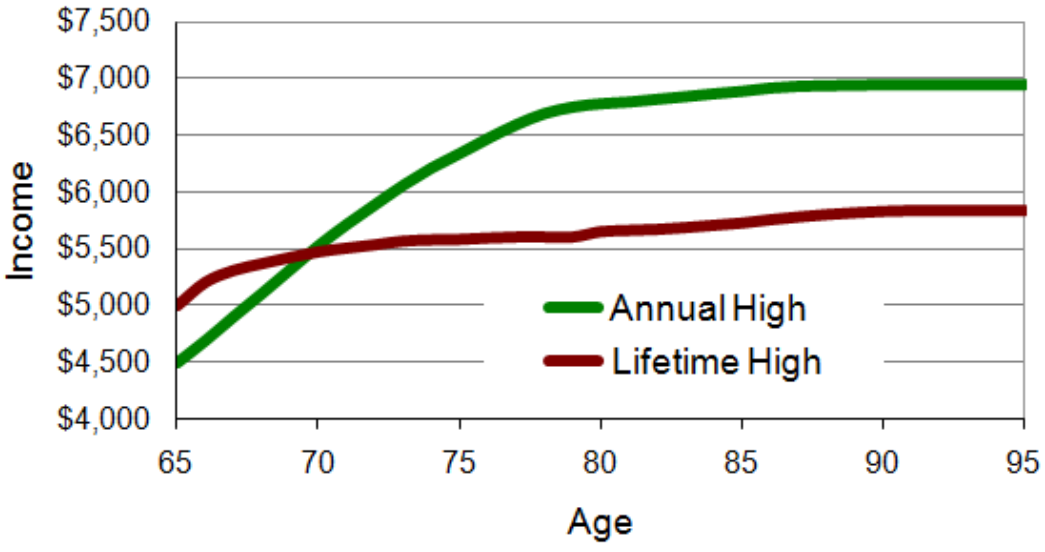


Figure 10: The breakeven age for payments for the top decile outcome

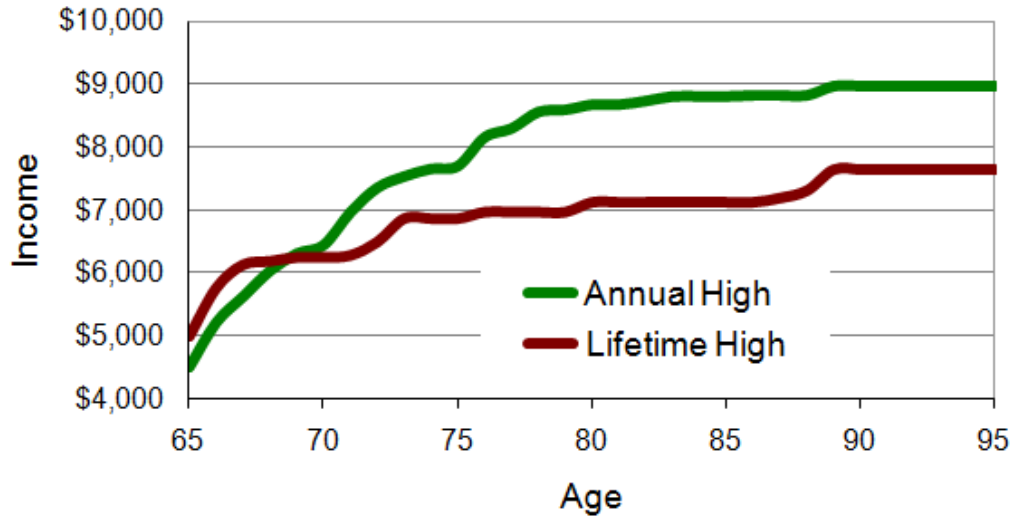
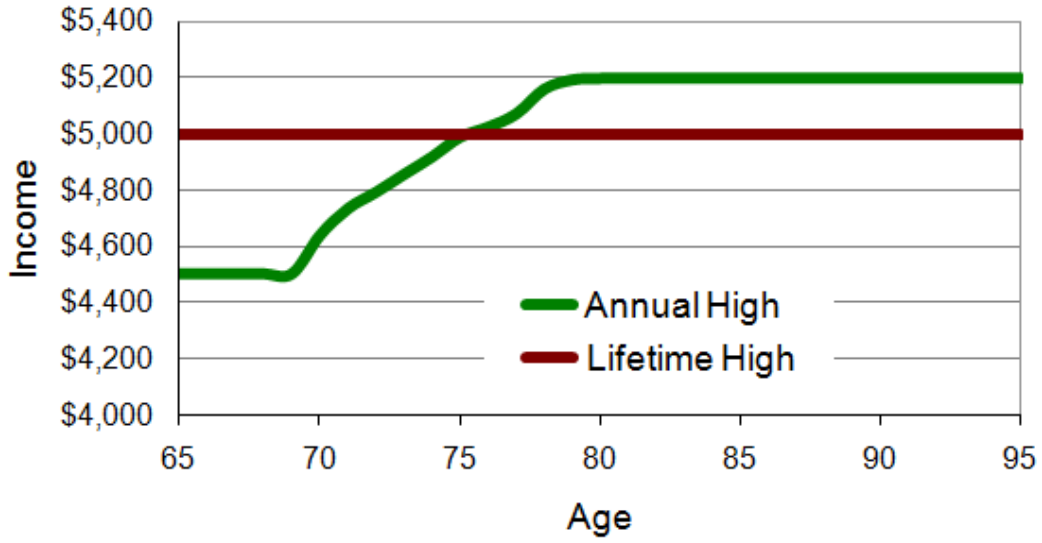


Figure 11: The breakeven age for payments for the bottom decile outcome



Update 1:

In 2012, the payout from annual high reset GMWBL plans were reduced from 4.5% to 4.0% for the starting age 65. The following tables and charts reflect our analysis incorporating this change.

We apply the same procedure and calculate the aftcast for all years of retirement starting in 1900. Table 8 shows the historical statistics for each reset method.

- The median number of pay increases (step-ups) for the annual high reset method remained the same, five. This is significantly higher than the median number of pay increases of the lifetime high reset method, which is one.
- 34% of the time the lifetime high reset method experienced no pay increases. The annual high reset method always had a pay increase.
- Even though the starting withdrawal amount using the annual high reset method was 20% lower than using the lifetime high reset method ($4,000 versus $5,000), the annual high reset method provided a significantly higher income for the median and top-decile outcomes at age 85. It provided a lower income for the unlucky outcome at age 85.

Table 8: Historical statistics comparing the two different reset methods

	Annual High Step-up Reset	Lifetime High Step-up Reset
Median Number of Step-ups	5	1
Probability of a “never” Step-up	0%	34%
Median annual income at age 85	$6,202	$5,282
Top-decile annual income at age 85	$8,485	$7,122
Bottom-decile annual income at age 85	$4,849	$5,000

The Breakeven Age of Payment Streams:

With the annual high reset method, the payments start at 4.0% (of GWB) at age 65. On the other hand, in all examples using the lifetime high reset method, the payments start at 5% at age 65.

Where is the breakeven age? Going back to Bob's example, looking at the historical *average* income since 1900, this breakeven age was 74. If we look at the *top decile* income (top 10%), the breakeven age was 71. On the other hand, looking at the *bottom decile* income (bottom 10%), the income with the annual high reset method remained below the unlucky income from a lifetime high reset method, for life.

In majority of historical cases, payments provided by the annual high reset method paid a higher cumulative income over the typical retirement time horizon.

Figure 12: The breakeven age for payments for the average outcome

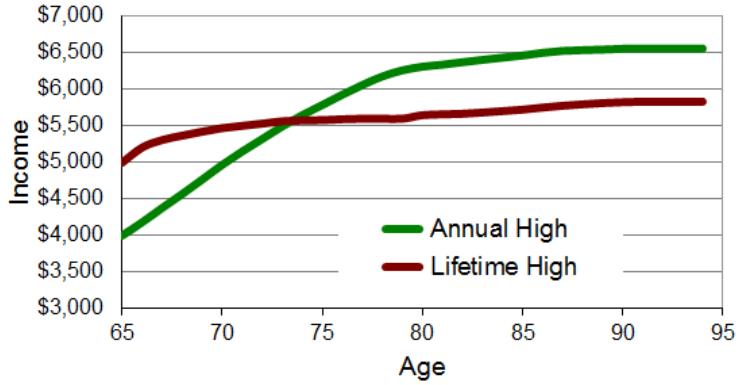


Figure 13: The breakeven age for payments for the top decile outcome

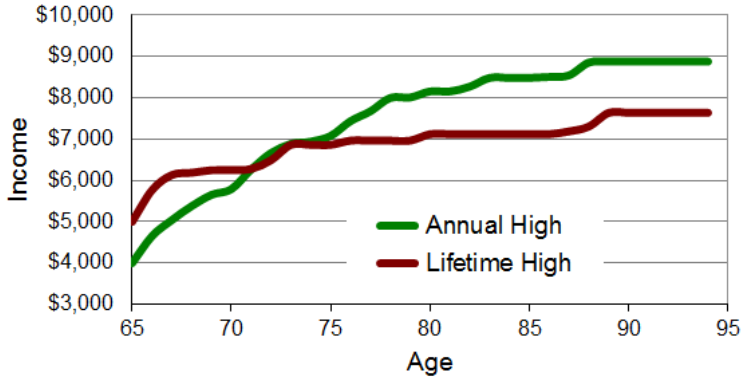
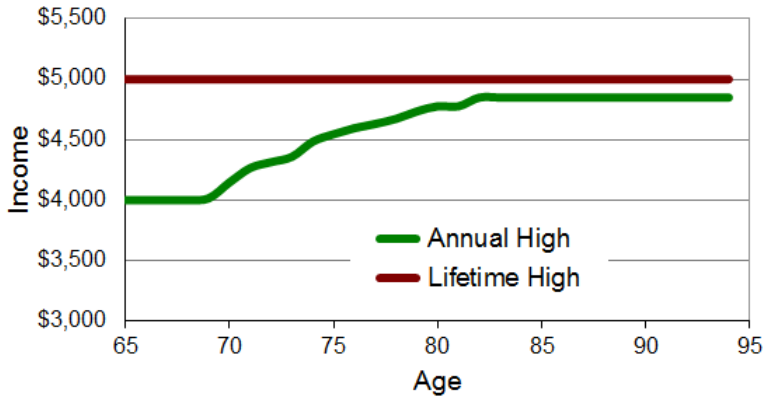


Figure 14: The breakeven age for payments for the bottom decile outcome



About Aftcast.com

Aftcast.com provides research in the area of retirement income products to its clients. The research is based on non-Gaussian philosophy using actual market history. It helps its clients to better understand the behavior and impact of retirement income products under various, non-simulated, historical market environments. It provides the intelligence to its clients to make more informed decisions to manage and market their existing and planned retirement income products.

This report was researched and authored by Jim Otar, CFP, CMT, BASc, MEng, who is the founder of aftcast.com.

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