Develop Business/Financial Planning

How Variable Annuity Benefits Curb Risk in Retirement Portfolios

By Jim Otar, CMT, CFP
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Variable annuities with guaranteed minimum withdrawal benefits are popular tools in retirement income planning, and they can be very helpful in protecting your clients against longevity and market risk. However, they still leave your clients open to eroded purchasing power.

Variable annuities (VA) with guaranteed minimum withdrawal benefits (GMWB) were first introduced by Hartford in 2002. In 2004, sales of all variable annuities (with or without GMWB) in the U.S. reached $128 billion, of which 69% of all sales had the GMWB rider. The total assets in VA's were about $1.1 trillion at the end of 2004. Most come with withdrawal benefits guaranteed for life, although some have only a 20-year guarantee period. For the purposes of this study we only look at variable annuities with guaranteed withdrawal benefits for life (VAGW) to demonstrate the benefits, pitfalls, the hype, and the truth based on market history.

A VAGW has a market value, which fluctuates just like a mutual fund. This is called the "contract value." In addition, there is another balance to track, which is called the "guaranteed withdrawal base" (GWB). Its value does not fluctuate with market conditions, but it is used to calculate the income payments. The day you buy the VAGW, both the contract value and the GWB are the same, i.e. your initial premium. Even if the contract value goes down to zero in adverse markets, annual payments continue for the life of the contract based on the GWB.

There are several important features and benefits of VAGW:

- **Guaranteed pay.** Most plans pay for life 5% of the GWB each year. Some may pay higher, however for our purposes we will use 5%. For example, if a client buys a VAGW with $100,000 at age 65, he is guaranteed to receive $5,000 each year for the rest of his life regardless of how his investments perform.

- **Step-up reset.** If the portfolio does well and the contract value exceeds the GWB, then the base is reset higher, equal to the contract value. Most contracts allow for annual resets. Some companies allow resets for 30 years from the initial contract date; others allow resets until age 80. Read the fine print.

- **Bonus.** If your client buys a VAGW prior to needing the income, then a bonus is added to the GWB, which increases the guaranteed income when it starts. For example, if you sell a $100,000 VAGW to a 55-year old client and he is planning to start withdrawing at age 65, his GWB is increased to $150,000 by age 65, even if the

investments stay flat or goes down. Most insurance companies pay a 5% bonus, although some offer higher. If there is a reset that increases the GWB by more than the bonus amount in a given year, then no bonus is added. There is usually a time limit on bonus accumulation—usually 10 years but again, read the fine print.

- **Other benefits.** The same benefits that are available for a regular variable annuity also apply to a VAGW such as death benefits, principle protection, and conversion to a life annuity. Keep in mind these benefits—or riders—differ from plan to plan, and usually come with additional costs. In this article, we will ignore these riders and only focus on the guaranteed withdrawal benefit.

What happens if you need less money than the guaranteed 5%? Most contracts do not allow carrying forward of withdrawals. Some allow up to a certain limit (10% or 15%) in a subsequent year. A good idea is to take out the entire guaranteed amount each year even if your client doesn't need it and invest any surplus in a separate account. If you leave it in, you would be paying fees for guarantees for no additional benefit.

Can you take out all of your money at anytime? You can cash out all of it (contract balance) at anytime subject to redemption fees, taxes, and other charges.

The lucky retiree

Given the mechanics of VAGW's, let's work thorough an example of how they can be used in retirement planning. Bob, 65, is just retiring. He buys a VAGW for $100,000 that guarantees 5% withdrawal or $5,000 for life. His contract allows him annual resets until age 95. The asset mix is 80% S&P 500 index and 20% fixed income. Because we are using actual market history for our calculations, let's have him retire at the beginning of 1949.

The following table indicates the contract balance, GWB, the annual and cumulative cost of the guarantee rider, cumulative benefit, and cumulative withdrawals.

Table 1: Summary of VA Costs, Benefits, and Withdrawals							
Year	Age	Contract Balance[1]	GWB	Withdrawal	Cost of Guarantees per year[2]	Cumulative Cost[3]	Cumulative Benefit[4]	Cumulative Withdrawal[5]
1949	65	$100,000	$100,000	$5,000	$500	$510	$0	$5,100
1950	66	$102,833	$102,833	$5,142	$539	$1,080	$0	$10,548
1951	67	$118,654	$118,654	$5,933	$619	$1,755	$0	$17,022
1952	68	$126,086	$126,086	$6,304	$660	$2,498	$0	$24,133
1953	69	$128,178	$128,178	$6,409	$672	$3,284	$0	$31,635
1954	70	$119,098	$128,178	$6,409	$628	$4,056	$0	$39,438
1955	71	$150,588	$150,588	$7,529	$785	$5,019	$0	$48,695
1956	72	$171,935	$171,935	$8,597	$897	$6,135	$0	$59,412
1957	73	$167,742	$171,935	$8,597	$882	$7,279	$0	$70,557
1958	74	$147,038	$171,935	$8,597	$778	$8,364	$0	$82,148
1959	75	$180,080	$180,080	$9,004	$943	$9,661	$0	$94,618

1960	76	$177,945	$180,080	$9,004	$935	$11,001	$0	$107,587
1961	77	$169,948	$180,080	$9,004	$895	$12,354	$0	$121,074
1962	78	$192,699	$192,699	$9,635	$1,009	$13,876	$0	$135,745
1963	79	$165,394	$192,699	$9,635	$875	$15,324	$0	$151,002
1964	80	$181,250	$192,699	$9,635	$954	$16,911	$0	$166,870
1965	81	$191,179	$192,699	$9,635	$1,004	$18,611	$0	$183,373
1966	82	$196,344	$196,344	$9,817	$1,030	$20,406	$0	$200,721
1967	83	$167,315	$196,344	$9,817	$886	$22,126	$0	$218,763
1968	84	$185,580	$196,344	$9,817	$977	$24,007	$0	$237,528
1969	85	$188,683	$196,344	$9,817	$993	$25,980	$0	$257,042
1970	86	$163,999	$196,344	$9,817	$869	$27,906	$0	$277,337
1971	87	$156,642	$196,344	$9,817	$832	$29,871	$0	$298,445
1972	88	$161,489	$196,344	$9,817	$857	$31,939	$0	$320,396
1973	89	$172,715	$196,344	$9,817	$913	$34,148	$0	$343,225
1974	90	$140,952	$196,344	$9,817	$754	$36,283	$0	$366,968
1975	91	$100,170	$196,344	$9,817	$550	$38,295	$0	$391,660
1976	92	$116,684	$196,344	$9,817	$633	$40,472	$0	$417,340
1977	93	$125,605	$196,344	$9,817	$677	$42,781	$0	$444,047
1978	94	$105,054	$196,344	$9,817	$574	$45,078	$0	$471,823

[1]The asset mix is 80% S&P 500 index and 20% fixed income. Equity: alpha: 2%, expenses 2%. Fixed Income: net yield 6-month CD interest rate plus 0.5 [2]The cost of guarantees (GMWB, death, principal) is calculated as 0.5% of the contract value at the start of the year.

[3]Each year's annual rider cost is compounded by 4% annually to bring to present value at expiry.

[4]If the contract balance is larger than the annual payment amount then there is no benefit of guarantee. Otherwise, the annual benefit is guaranteed withdrawals less the contract balance, compounded by 4% annually to bring to present value at expiry.

[5]Each year's withdrawal is compounded by 4% annually to bring to present value at expiry.
%.

Source: Otar & Associates

In this particular case, Bob was lucky. His contract balance survived until age 95. He did not need any withdrawal guarantees. His benefit was zero. By age 95, he paid $45,078 for the GMWB rider, or 45% of his original investment. In this particular case, all of this money was wasted.

Figure 1 below shows the contract value, GWB, and the resets over time if he were to buy this contract in 1949. The green dots indicate where step-up resets occurred. Even if the contract value were to go to zero, the GMWB rider ensures that 5% of the last guaranteed withdrawal base is paid each and every year until contract expiry.

Figure 1: Bob's VA Value
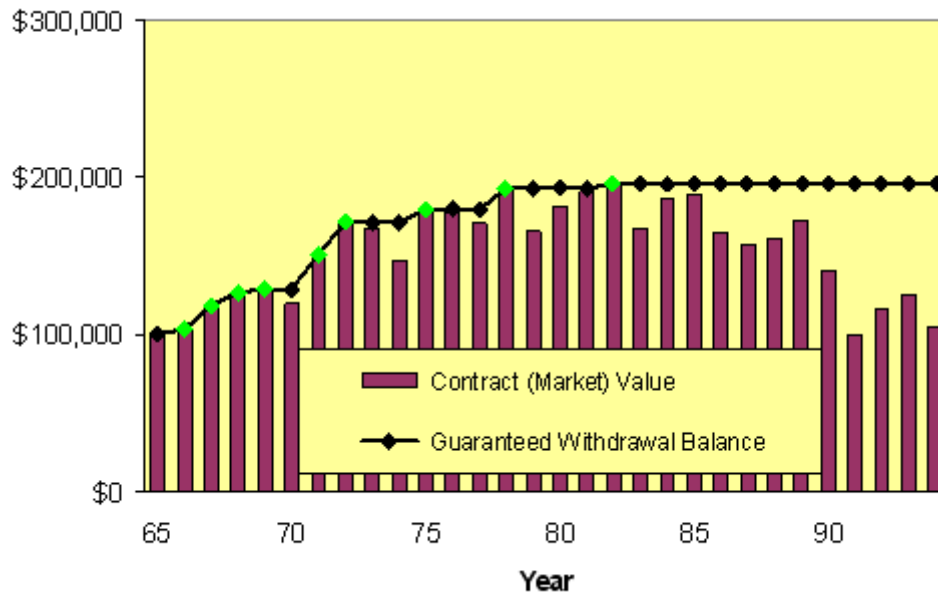
Source: Otar & Associates

The unlucky retiree

Let's look at the situation if Joe were to retire at the beginning of 1931. Table 2 below indicates the outcome:

Year	Age	Contract balance[1]	GWB	Withdrawal	Cost of guarantees per year[2]	Cumulative Cost[3]	Cumulative benefit[4]	Cumulative withdrawal[5]
Table 2: Summary of VA Costs, Benefits, and Withdrawals								
1931	65	$100,000	$100,000	$5,000	$500	$510	$0	$5,100
1932	66	$56,638	$100,000	$5,000	$308	$845	$0	$10,404
1933	67	$45,187	$100,000	$5,000	$251	$1,134	$0	$15,920
1934	68	$57,728	$100,000	$5,000	$314	$1,500	$0	$21,657
1935	69	$47,005	$100,000	$5,000	$260	$1,825	$0	$27,623
1936	70	$60,162	$100,000	$5,000	$326	$2,230	$0	$33,828
1937	71	$68,408	$100,000	$5,000	$367	$2,694	$0	$40,281
1938	72	$43,716	$100,000	$5,000	$244	$3,050	$0	$46,993
1939	73	$42,298	$100,000	$5,000	$236	$3,413	$0	$53,972
1940	74	$36,635	$100,000	$5,000	$208	$3,762	$0	$61,231
1941	75	$27,359	$100,000	$5,000	$162	$4,078	$0	$68,780
1942	76	$18,918	$100,000	$5,000	$120	$4,363	$0	$76,632
1943	77	$15,832	$100,000	$5,000	$104	$4,644	$0	$84,797
1944	78	$13,000	$100,000	$5,000	$90	$4,921	$0	$93,289
1945	79	$9,406	$100,000	$5,000	$72	$5,191	$0	$102,120
1946	80	$6,909	$100,000	$5,000	$60	$5,460	$4,128	$111,305

1947	81	$1,0304	$100,000	$5,000	$30	$5,709	$9,494	$116,808
1948	82	$0	$100,000	$5,000	$5	$5,943	$15,073	$121,481
1949	83	$0	$100,000	$5,000	$0	$6,180	$20,876	$126,3400
1950	84	$0	$100,000	$5,000	$0	$6,427	$26,911	$131,393
1951	85	$0	$100,000	$5,000	$0	$6,685	$33,188	$136,649
1960	86	$0	$100,000	$5,000	$0	$6,952	$39,715	$142,115
1961	87	$0	$100,000	$5,000	$0	$7,230	$46,504	$147,800
1962	88	$0	$100,000	$5,000	$0	$7,519	$53,564	$153,712
1963	89	$0	$100,000	$5,000	$0	$7,820	$60,907	$159,860
1964	90	$0	$100,000	$5,000	$0	$8,133	$68,543	$166,255
1965	91	$0	$100,000	$5,000	$0	$8,458	$76,485	$172,905
1966	92	$0	$100,000	$5,000	$0	$8,796	$84,744	$179,821
1967	93	$0	$100,000	$5,000	$0	$9,148	$93,334	$187,014
1968	94	$0	$100,000	$5,000	$0	$9,514	$102,267	$194,494

[1]The asset mix is 80% S&P 500 index and 20% fixed income. Equity: alpha 2%, expenses 2%. Fixed Income: net yield 6-month CD interest rate plus 0.5%. [2]The cost of guarantees (GMWB, death, principal) is calculated as 0.5% of the contract value at the start of the year.

[3]Each year's annual rider cost is compounded by 4% annually to bring to present value at expiry.

[4] If the contract balance is larger than the annual payment amount, then there is no benefit of guarantee. Otherwise, the annual benefit is guaranteed withdrawals less the contract balance, compounded by 4% annually to bring to present value at expiry.

[5] Each year's withdrawal is compounded by 4% annually to bring to present value at expiry.

Source: Otar & Associates

Figure 2, below, shows the same in a graph.

Figure 2: Joe's VA Value
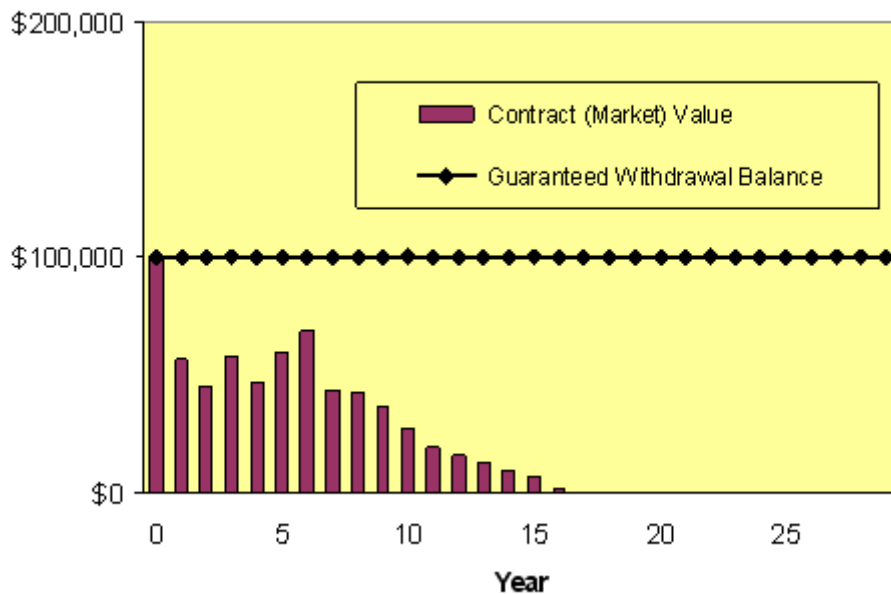
Source: Otar & Associates

The year 1931 was a bad year to retire. Fortunately, Joe's VAGW contract paid him for life, even though his portfolio expired at age 81. His total cost for the guarantee was $9,514. His total benefit, the dollar amount of payments he received because of the guarantee, was $102,267. In this case, the withdrawal guarantee rider was well worth buying, he got back 975% return on his cost!

The historic cost/benefit analysis of guaranteed withdrawals

Retirees in 1949 were lucky. Retirees in 1931 were unlucky. The main purpose of retirement planning is to reduce the luck factor to an acceptable level. Therefore, we need to look at the entire market history and quantify the luck factor in Bob's retirement planning. We repeat the same process that we did for years 1931 and 1949 earlier, but for all years since 1900. We calculate the cost and the benefit of the guaranteed minimum withdrawals until age 95.

Table 3: Costs & Benefits of GMWB to Age 95		
Retirement Year	Cumulative Cost of GMWB	Cumulative Benefit of GMWB
1900	$21,411	$42,339
1901	$18,915	$46,145
1902	$16,711	$49,908
1903	$15,951	$53,970
1904	$19,243	$74,491
1905	$15,700	$72,214
1906	$13,377	$74,038
1907	$13,813	$64,949
1908	$19,012	$56,166
1909	$14,850	$53,512
1910	$13,141	$58,540
1911	$15,012	$51,139
1912	$15,685	$46,107
1913	$15,487	$45,426
1914	$18,756	$23,803
1915	$20,615	$33,715
1916	$17,118	$35,671
1917	$16,769	$44,945
1918	$22,951	$82,901
1919	$21,512	$92,322
1920	$19,533	$98,948
1921	$23,870	$144,117
1922	$23,525	$163,396
1923	$20,108	$159,766

1924	$20,236	$185,365
1925	$17,348	$182,133
1926	$14,688	$178,678
1927	$13,515	$193,512
1928	$10,259	$174,265
1929	$6,928	$145,716
1930	$7,078	$140,647
1931	$9,514	$102,267
1932	$19,402	$77,989
1933	$22,195	$106,922
1934	$15,954	$89,969
1935	$17,553	$118,825
1936	$12,364	$98,565
1937	$9,507	$92,800
1938	$23,752	$0
1939	$22,696	$0
1940	$26,125	$0
1941	$33,903	$0
1942	$42,352	$0
1943	$41,083	$0
1944	$38,529	$0
1945	$36,866	$0
1946	$30,482	$0
1947	$39,430	$0
1948	$43,433	$0
1949	$45,078	$0
1950	$44,436	$0
1951	$39,016	$0
1952	$37,043	$0
1953	$36,612	$0
1954	$39,694	$0
1955	$31,575	$0
1956	$27,566	$0
1957	$28,040	$0
1958	$31,842	$0
1959	$25,784	$0
1960	$25,755	$0
1961	$26,673	$0
1962	$23,198	$0
1963	$26,757	$0

1964	$24,005	$0
1965	$22,304	$0
1966	$21,198	$0
1967	$25,752	$0
1968	$22,952	$0
1969	$22,349	$0
1970	$28,607	$0
1971	$30,410	$0
1972	$29,776	$0
1973	$27,952	$0
1974	$40,387	$0
1975	$58,515	$0
1976	$50,094	$0
1977	$46,503	$0

Source: Otar & Associates

Figure 3, below, depicts the outcome in graphic format.
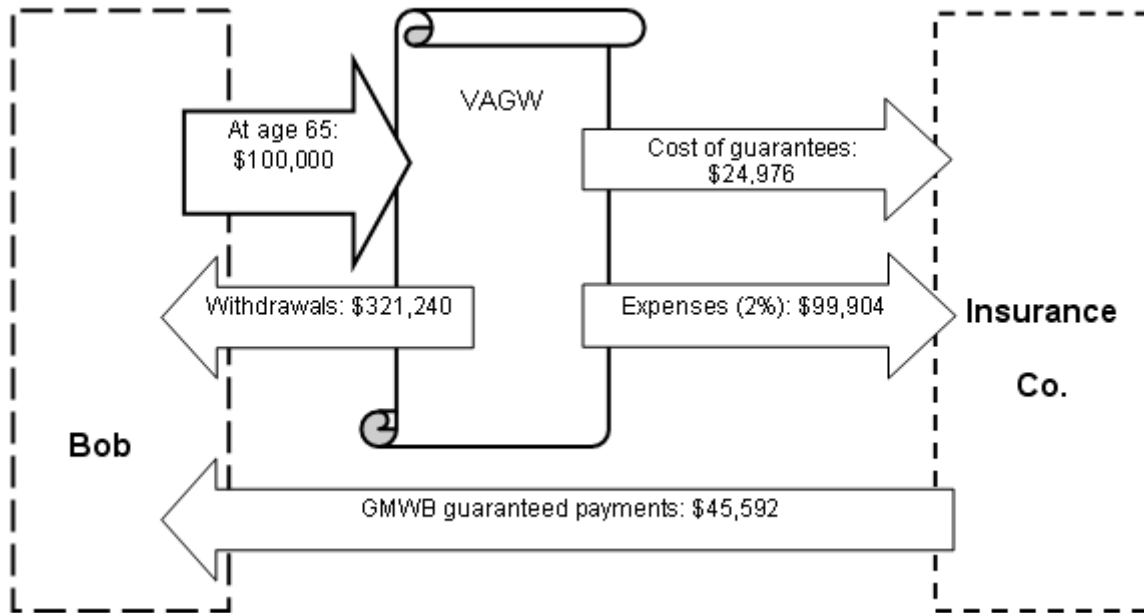
Figure 3: Cost & Benefit of GMWB to Age 95
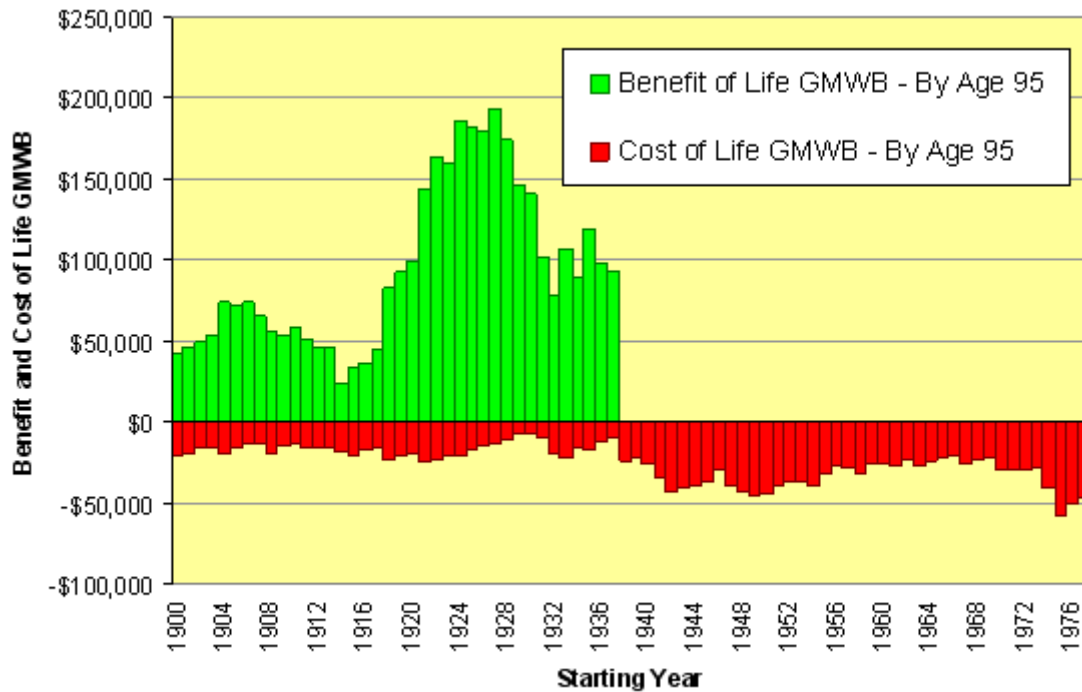
Source: Otar & Associates

The average cost of the guarantees for all years of retirement since 1900 was $24,976 and the benefit was $45,592. Since 1938, the average cost of guarantees was $32,963 and the average benefit was $0. Figure 4 shows the average money flow for all years since 1900 by age 95:
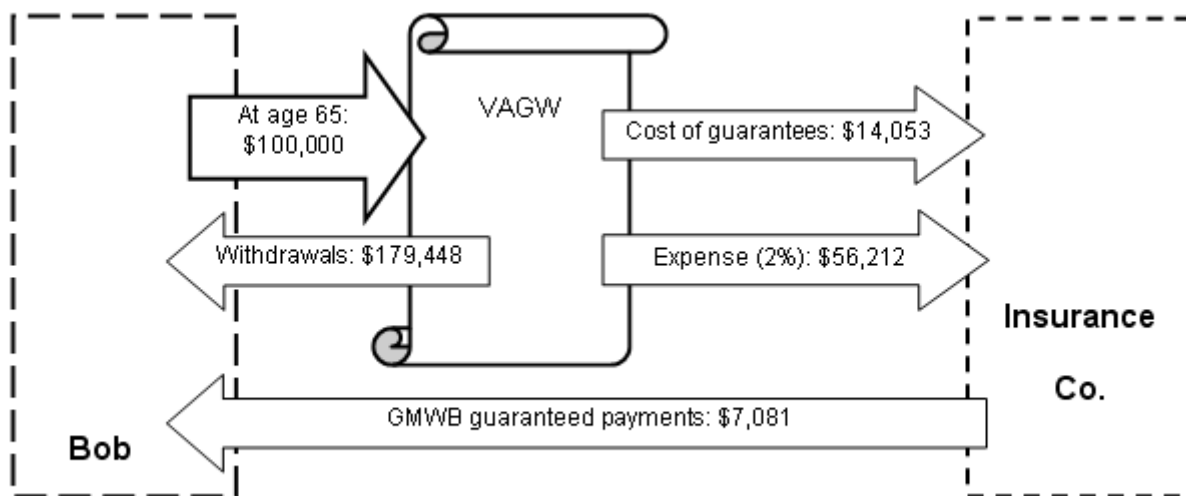
Figure 4: Money Flow to Age 95

At age 65: $100,000

VAGW

Cost of guarantees: $24,976

Withdrawals: $321,240

Expenses (2%): $99,904

Insurance Co.

Bob

GMWB guaranteed payments: $45,592

Source: Otar & Associates

Since the average benefit ($45,592) was almost twice as much as the average cost of the rider ($24,976), does this mean the insurance company is losing money? The answer is no. These numbers reflect the outcome if the retiree lives until age 95.

The average age of death of a 65-year old male is age 85. When we use age 85, and recalculate everything, the average cash flow since 1900 looks quite different. Now, we see how the house (i.e. the insurance company) makes a profit.

Figure 5: Money Flow to Age 85

At age 65: $100,000

VAGW

Cost of guarantees: $14,053

Withdrawals: $179,448

Expense (2%): $56,212

Insurance Co.

Bob

GMWB guaranteed payments: $7,081

Source: Otar & Associates

Remaining assets

One might also want to know the contract value of the portfolio over time. Since averages are meaningless in this case, contract values at ages 85 and 95 for all retirement years since 1900 are indicated in Figure 6.

Figure 6: Contract Values at Ages 85 & 95 Since 1900
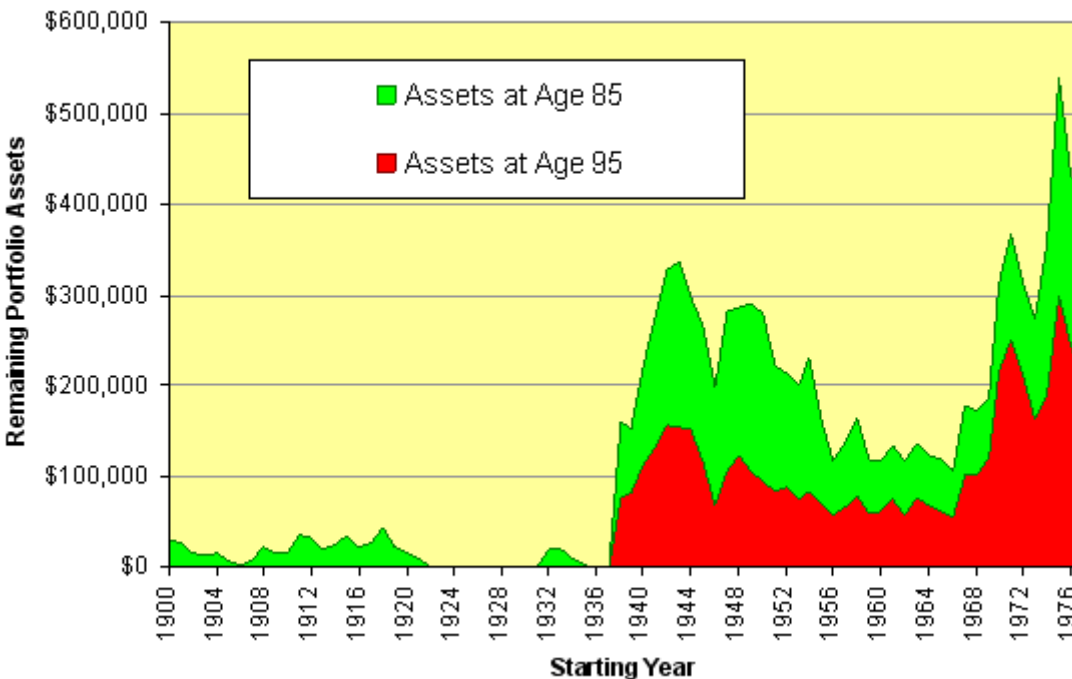
Source: Otar & Associates

However, the important question still remains unanswered: Do VA's with GMWB solve the retirement income problem? You have to look at the bigger picture: There are three main risk factors in retirement planning: longevity risk, market risk, and inflation risk. The combined effect of these risk factors can be called the time value of fluctuations.

The VAGW solves the first two problems by eliminating market and longevity risk. However, inflation risk still remains an issue despite resets that promise to protect a client's purchasing power. To fully protect clients against future inflation, you will need to look beyond VAGWs and supplement the portfolio with vehicles and/or asset allocations. Click here to determine How to Inflation-Proof Variable Annuity Portfolios.

Note to Canadian readers: Findings and conclusions in this set of articles apply only to variable annuities available in the U.S.A. In all examples, the guarantee period is life, guaranteed withdrawal amount is 5% of the GWB, bonus 5% for a maximum of 10 years, and step-up resets are annual. The results for the Canadian variable annuities are significantly different.

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