

PORTFOLIO



Retirement Crash Test

The ideal portfolio approach should control downside risk while also achieving a reasonable rate of growth. **By Craig L. Israelsen**

If your client's portfolio is following the tired "your age in bonds" axiom – that is, that the percentage allocated to bonds should equal your client's age – you may want to reassess your strategy.

Bonds present less volatility than stocks, of course – but that's not the only consideration one should make when building a portfolio. The optimal portfolio needs to serve two goals: controlling downside risk while also achieving a reasonable rate of growth.

The order in which returns occur has a dramatic impact on the longevity of a retirement portfolio. Market-based losses (or very low positive returns) in the early years can be disastrous to the long-term solvency of a portfolio.

Thus, the portfolio needs to be sufficiently diversified so as to minimize the timing-of-returns risk. Building a portfolio that has a very large allocation in any one asset class is simply asking for trouble.

In truth, the age-in-bonds strat-

egy has always been a questionable idea for older clients.

LONG-TERM ANALYSIS

There are four core asset classes we can measure back to 1926: U.S. bonds, U.S. large- and small-cap equities and cash. To perform a long-term analysis, I used these asset classes to construct various model retirement portfolios.

Bonds have done a good job of avoiding losses (in nominal terms) over the past eight-plus decades. From 1926 to 2013, U.S. bonds averaged an annualized return of 5.4%, with a standard deviation of 5.7%. The worst one-year return for bonds was a loss of 2.9% in 1994.

Over these 88 years, there were nine years in which bonds had a negative return. In those years, the average loss was 1.3%.

Yet bonds have also experienced protracted periods of very low returns, and those create a distinct challenge in a retirement portfolio, particularly if the return is below the

withdrawal rate.

For instance, from 1941 to 1969, bonds experienced a 29-year period in which the average annualized return was a mere 2.2%. During those same years, large-cap U.S. stocks were averaging 12.8% and small-cap stocks were averaging 18.6%. This simple observation reminds us of the value in diversifying, particularly during a client's retirement years.

Large-cap U.S. stocks (as represented by the S&P 500) have produced an average annualized return of 10.1% from 1926 to 2013, with a standard deviation of 20.2%. Large-cap stocks endured 24 negative years, or losses 27% of the time, in this period. The largest loss was 43.3% in 1931, and the average loss was 13.6%.

Small-cap U.S. stocks have an even more colorful past. Over the past 88 years, small-caps have produced an average annualized return of 11.5%, a standard deviation of 31.9% and a worst one-year loss of

CAN THIS PORTFOLIO SURVIVE?

The following durability test compares three different withdrawal rates for three different portfolios.* The ending balances (in dollars) at age 100 are shown over 54 rolling 35-year periods, with **red** numbers indicating the age at which the portfolio ran out of money.

Start Year	End Year	3% INITIAL WITHDRAWAL RATE Total 35-Year Withdrawal \$453,466			4% INITIAL WITHDRAWAL RATE TOTAL 35-YEAR WITHDRAWAL \$604,621			5% INITIAL WITHDRAWAL RATE TOTAL 35-YEAR WITHDRAWAL \$755,776		
		100% U.S. Bonds	Age-in-bonds Portfolio	4-Asset Portfolio	100% U.S. Bonds	Age-in-bonds Portfolio	4-Asset Portfolio	100% U.S. Bonds	Age-in-bonds Portfolio	4-Asset Portfolio
1926	1960	38,821	254,794	1,131,652	93	99	448,573	88	91	93
1927	1961	22,004	230,772	1,280,458	92	98	540,057	87	91	95
1928	1962	11,958	133,121	879,475	92	94	204,192	87	88	89
1929	1963	25,525	33,384	526,547	92	91	93	87	85	83
1930	1964	5,227	63,864	1,158,832	92	92	402,917	87	85	91
1931	1965	99	153,087	2,130,748	91	95	1,325,631	86	88	520,515
1932	1966	15,109	442,157	3,685,049	92	152,499	2,968,103	87	96	2,251,157
1933	1967	98	485,862	5,075,712	91	201,740	4,249,911	86	97	3,424,110
1934	1968	99	337,257	3,160,486	91	47,630	2,294,021	86	92	1,427,556
1935	1969	97	336,800	2,739,704	89	56,848	1,998,121	85	93	1,256,537
1936	1970	95	213,052	1,997,695	88	96	1,292,545	84	88	587,395
1937	1971	95	134,399	1,444,097	88	93	712,589	84	86	99
1938	1972	96	373,136	2,922,150	88	29,038	2,196,339	84	91	1,470,528
1939	1973	95	270,440	2,133,710	87	97	1,519,856	83	89	906,002
1940	1974	94	324,284	2,054,560	87	98	1,535,078	83	90	1,015,595
1941	1975	94	463,041	2,902,460	87	94,702	2,305,756	83	92	1,709,052
1942	1976	95	724,008	4,179,721	87	317,287	3,505,844	83	97	2,831,967
1943	1977	95	704,086	3,716,939	87	304,413	3,067,072	83	97	2,417,205
1944	1978	95	627,528	2,850,389	87	240,534	2,197,648	83	95	1,544,907
1945	1979	96	601,680	2,661,281	87	224,434	1,949,312	83	95	1,237,343
1946	1980	96	484,624	2,143,006	87	112,206	1,339,636	83	92	536,266
1947	1981	97	653,211	2,672,365	88	275,227	1,897,156	83	97	1,121,948
1948	1982	98	944,344	3,395,739	88	469,203	2,523,834	83	99	1,651,929
1949	1983	5,623	1,095,674	4,150,136	88	608,828	3,217,613	83	121,982	2,285,091
1950	1984	36,672	1,203,530	3,964,190	89	675,053	3,061,440	83	146,576	2,158,689
1951	1985	111,824	1,295,448	3,904,449	90	687,391	2,885,306	84	79,335	1,866,163
1952	1986	213,242	1,396,801	4,037,306	91	737,120	2,996,950	84	77,440	1,956,594
1953	1987	277,326	1,373,692	3,940,111	92	735,971	2,976,075	85	98,250	2,012,039
1954	1988	326,361	1,617,860	4,849,301	92	972,703	3,850,301	85	327,547	2,851,300
1955	1989	417,748	1,354,176	3,914,660	93	657,681	2,834,862	85	98	1,755,064
1956	1990	586,942	1,289,765	3,289,401	97	574,820	2,309,458	87	96	1,329,514
1957	1991	826,667	1,618,002	4,159,919	106,802	838,602	3,041,117	88	59,203	1,922,314
1958	1992	788,363	1,904,557	5,185,342	59,790	1,120,794	4,074,466	87	337,031	2,963,589
1959	1993	1,053,576	1,707,972	4,022,328	302,531	900,800	2,896,047	90	93,629	1,769,766
1960	1994	1,172,465	1,691,783	3,779,051	489,047	957,064	2,742,801	94	222,345	1,706,551
1961	1995	1,137,129	1,886,278	4,723,705	377,338	1,069,780	3,563,345	91	253,282	2,402,986
1962	1996	1,263,655	1,723,197	4,368,497	526,138	927,095	3,176,102	94	130,993	1,983,706
1963	1997	1,340,301	2,094,920	5,821,254	583,326	1,275,152	4,545,836	95	455,384	3,270,417
1964	1998	1,557,320	2,095,441	5,573,466	789,190	1,257,261	4,296,644	21,060	419,080	3,019,822
1965	1999	1,549,126	1,935,434	5,480,921	838,395	1,151,259	4,181,866	127,664	367,085	2,882,810
1966	2000	1,855,117	2,151,682	4,671,168	1,117,501	1,329,137	3,465,213	379,886	506,592	2,259,258
1967	2001	1,986,198	2,601,290	5,198,262	1,243,704	1,768,895	4,095,264	501,211	936,500	2,992,267
1968	2002	2,328,539	2,633,766	3,319,438	1,571,537	1,779,858	2,383,260	814,534	925,950	1,447,083
1969	2003	2,397,840	2,626,061	3,342,091	1,670,392	1,797,642	2,304,753	942,943	969,224	1,267,416
1970	2004	2,723,598	3,183,576	4,454,470	2,026,600	2,383,382	3,425,656	1,329,601	1,583,187	2,396,842
1971	2005	2,243,084	2,872,448	4,725,541	1,584,085	2,111,897	3,755,952	925,085	1,351,347	2,786,362
1972	2006	2,144,616	2,707,048	4,695,923	1,509,595	1,969,234	3,719,269	874,573	1,231,420	2,742,615
1973	2007	2,240,383	2,636,020	4,560,196	1,614,050	1,901,877	3,639,136	987,717	1,167,733	2,718,077
1974	2008	2,324,543	3,118,800	4,635,344	1,717,994	2,408,147	3,942,628	1,111,444	1,697,493	3,249,912
1975	2009	2,382,680	3,918,230	6,300,614	1,792,373	3,232,763	5,602,343	1,202,066	2,547,296	4,904,072
1976	2010	2,371,167	3,450,940	5,389,460	1,793,586	2,782,365	4,694,884	1,216,004	2,113,790	4,000,308
1977	2011	2,105,276	3,032,009	4,142,743	1,530,893	2,369,026	3,510,378	956,510	1,706,044	2,878,013
1978	2012	2,221,003	3,437,620	4,328,418	1,670,582	2,806,530	3,711,384	1,120,161	2,175,441	3,094,350
1979	2013	2,259,750	3,452,713	4,667,711	1,765,656	2,889,081	4,022,195	1,271,562	2,325,449	3,376,680
Success Ratio		69%	100%	100%	43%	82%	98%	30%	54%	89%
Avg Balance @ Age 100		821,607	1,446,216	3,637,744	494,095	911,166	2,766,606	255,223	452,345	1,928,883

*The 100% U.S. bond portfolio consisted of Ibbotson U.S. Intermediate Government Bonds from 1926-1975 and the Barclays Capital Aggregate Bond Index from 1976-2013. The age-in-bonds portfolio assigned the allocation to U.S. bonds equal to the investor's age from 65 to 99, with the balance of the portfolio allocated to large-cap U.S. stock. The four-asset portfolio consisted of 25% S&P 500, 25% small-cap U.S. stock (Ibbotson Small Company Stock Index from 1926-1978 and Russell 2000 Index from 1979-2013), 25% U.S. bonds (as described above) and 25% U.S. 90-day Treasury bills. Assumptions: \$250,000 starting balance, 3% annual COLA increases in withdrawals. Source: Author calculations from Lipper data

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58% in 1937. Small-caps have experienced a one-year loss 28 times since 1926, or nearly 32% of the time; the average loss in those years was 16.8%.

Finally, we consider the performance of cash (defined here as U.S. 90-day Treasury bills). From 1926 to 2013, cash had an average annualized return of 3.6%, a standard deviation of return of 3.3% and a worst one-year return of a loss of 0.02%, in 1938. That was the only year with a nominal loss (ignoring inflation).

3 PORTFOLIOS

The performance of three different retirement portfolios is illustrated in the “Can This Portfolio Survive?” table on the previous page. Shown

of U.S. bonds, U.S. large-cap stocks, U.S. small-cap stocks and cash.

The objective here is to determine how often each portfolio remained solvent for a full 35 years over 54 rolling periods, from 1926 to 2013. I believe that a portfolio that remains intact until an investor is 100 years old represents a worthy achievement.

The first simulation of portfolio durability assumes an initial withdrawal rate of 3% of the starting portfolio balance (which I arbitrarily set at \$250,000), with an annual cost-of-living adjustment of 3%. Thus, the first year’s withdrawal is \$7,500; the second year’s withdrawal is increased by 3% to \$7,725 and so on.

Bonds have done a good job of avoiding losses over the past eight-plus decades, but they have also experienced protracted periods of very low returns – a significant challenge.

here is the ending balance in each portfolio when the client hits age 100 (assuming retirement began at age 65). If the portfolio did not last for 35 years, the age of the investor at the point of portfolio insolvency is shown in red.

The first portfolio consists of 100% U.S. bonds. The second portfolio is an age-in-bonds model that allocates 65% to U.S. bonds at the start of retirement and increases the allocation to 66% the next year, 67% the next year and so on. The remaining allocation each year is committed to large-cap U.S. stocks.

The third portfolio is an equally weighted, annually rebalanced mix

The withdrawal in the 35th year is \$20,489. A total of \$453,466 is withdrawn over the 35-year period.

As shown in the table, a 100% bond portfolio only had a success ratio of 69%. That is, it remained solvent in 37 out of 54 rolling 35-year periods, or 69% of the time. And the 100% bond portfolio at a 3% withdrawal rate lasted 34 years during the period from 1931 to 1965 – the portfolio made it until the investor was 99 years old, not 100.

Starting in 1933 and lasting until 1948, there were 16 periods in which an all-bond portfolio failed to last a full 35 years. That said, in every case the portfolio did last until the inves-

tor was at least 94 years old.

By comparison, at a 3% withdrawal rate, both the age-in-bonds and four-asset portfolios lasted a full 35 years in all 54 rolling periods. Moreover, the retirement account balances at the end of the 35th year were dramatically larger than the all-bond portfolio in both cases.

The average ending balance for the all-bond portfolio (at age 100) was just over \$821,000; it was \$1.4 million for the age-in-bonds portfolio and \$3.6 million for the equally weighted portfolio.

4% WITHDRAWALS?

When the withdrawal rate was increased to 4%, the all-bond portfolio survived for a full 35 years in only 43% of the periods, and had an average ending balance, at age 100, of about \$494,000. Furthermore, in 16 of the rolling 35-year periods, the portfolio was out of money before the investor was 90 years old. By comparison, the age-in-bonds portfolio had an 82% success rate, and the four-asset portfolio a 98% success rate.

As noted by the abundant red text in the upper portion of the table, the all-bond retirement portfolio was particularly ineffective in persisting for a full 35 years during the 1940s, '50s and '60s, when bond returns were anemically low. The average ending balance at age 100 for the age-in-bonds portfolio was just over \$911,000, while it was \$2.8 million for the equally weighted portfolio.

At a withdrawal rate of 5% – rarely considered prudent – the all-bond portfolio survived for 35 years only 30% of the time, the age-in-bonds portfolio had a success ratio of 54% and the four-asset portfolio

survived 89% of the time. The average ending balance at age 100 for an all-bond portfolio was \$255,000, while it was \$452,000 for the age-in-bonds portfolio and \$1.9 million for the four-asset portfolio.

The importance of a diversified portfolio during retirement is clearly illustrated here. For retiree clients seeking an aggressive initial withdrawal rate of 5% or higher, it is incumbent to build a diversified portfolio that has growth potential combined with prudent downside protection. An all-bond or age-in-bonds approach ignores the virtues of diversification when it is arguably needed most – during the retirement years.

TIMING IS CRUCIAL

In a retirement portfolio, when money is being systematically withdrawn, the timing (or sequence) of returns is crucial. Look at the 35-year period from 1929 to 1963. At a 3% initial withdrawal rate, all three portfolios survived for the full 35 years, to age 100. At a 4% withdrawal rate, all three portfolios failed before the retiree reached the age of 94.

At 5%, meanwhile, the all-bond and age-in-bonds portfolios actually performed slightly better than the diversified four-asset portfolio – the only period during which that occurred – but all three portfolios failed prior to age 88.

The reason for the demise of the four-asset portfolio by the age of 83 during this particular period was the disastrous impact of U.S. stock returns from 1929 to 1932. Large-cap stocks had losses of 8.4%, 24.9%, 43.4% and 8.2% over this four-year period. Small-caps performed far

worse, with losses of 51.4%, 38.2%, 49.8% and 5.4%.

If a client's portfolio encounters large losses in the first few withdrawal years, the impact upon its durability can be especially devastating. Even so, given such huge losses, it is somewhat remarkable that the four-asset portfolio still lasted until

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the investor was 83 years old, well beyond the average life expectancy of a retiree during that era.

The all-bonds and age-in-bonds portfolios failed to survive because bond returns during that 35-year period were too low to sustain either of the higher withdrawal rates. The age-in-bonds portfolio was hurt slightly more than the all-bonds portfolio, due to its exposure to the stock market declines of 1929-1932.

Now consider the 35-year retirement period from 1933 to 1967. These results are markedly different: At a 3% initial withdrawal rate, the four-asset portfolio had an ending balance of over \$5 million, compared with just over \$526,000 during the period from 1929 to 1963. We see a nearly ninefold difference in outcome due to beginning retirement a mere four years later.

DRAMATIC DIFFERENCES

The differences in outcome are equally dramatic for the four-asset portfolio at a 4% and 5% withdrawal

rate. This illustrates sequence-of-returns risk. True, the Great Depression was a dramatic and rare event, but it does demonstrate the importance of the initial returns experienced by a portfolio.

By their nature, bond returns are less volatile and expose investors to less "timing of returns" risk. But the

painful trade-off is the inability of an all-bond or age-in-bonds portfolio to generate sufficient growth to sustain a withdrawal rate adequate to meet the needs of a retiree for 30-plus years.

There is no perfect retirement portfolio. Every investment faces some type of risk, including equity volatility risk, interest rate risk, inflation risk and currency risk. The key is to build a portfolio that addresses each unique risk while maintaining adequate exposure to needed portfolio growth. Diversification across asset classes is one such way. **FP**

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