

## Index Returns

	% Return			11/10
	1995	1996	1997	1998
<b>Bonds</b>				
Short-term	8.0	5.8	6.0	<b>4.8</b>
Intermediate	19.1	2.4	9.2	<b>9.3</b>
Long-term	30.1	-1.3	14.3	<b>9.2</b>
Global	16.0	10.8	8.3	<b>7.7</b>
<b>U.S. stocks</b>				
Large Market	37.5	22.9	33.2	<b>17.7</b>
Large Value	38.4	20.2	28.1	<b>6.8</b>
Small Market	28.7	18.2	24.6	<b>-10.1</b>
Small Value	29.3	22.3	30.7	<b>-9.6</b>
Real estate	12.1	33.8	19.3	<b>-15.1</b>
<b>Int'l stocks</b>				
Large Market	13.1	6.4	5.5	<b>7.8</b>
Large Value	11.5	7.8	-3.1	<b>7.2</b>
Small Market	0.5	2.6	-23.7	<b>3.2</b>
Small Value	1.2	1.0	-22.7	<b>1.5</b>
Emerg. Mkts.	2.2	11.4	-18.9	<b>-17.5</b>

Short-term bonds = DFA One-Year Fixed Income fund; Intermediate bonds = DFA Intermediate Government Bond fund; Long-term bonds = Vanguard Bond Index Long-term; Global bonds = DFA Global Fixed Income fund; U.S. Large Market = Vanguard Index 500 fund; U.S. Large Value = DFA Large Cap Value fund; U.S. Small Market = DFA US 6-10 fund; U.S. Small Value = DFA US 6-10 Value fund; Real Estate = DFA Real Estate Securities fund; Int'l Large Market = DFA International Large Cap fund; Int'l Large Value = DFA International Large Cap Value fund; Int'l Small Market = DFA International Small Company fund; Int'l Small Value = DFA International Small Cap Value fund; and Emerging Markets = DFA Emerging Markets fund.

This information is obtained from sources we believe are reliable, but we cannot guarantee its accuracy. **Past performance does not guarantee future returns.**

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**TAM Asset Management, Inc.**

321 San Anselmo Ave.  
San Anselmo, CA 94960  
phone: 415-459-8862  
fax: 415-459-1969

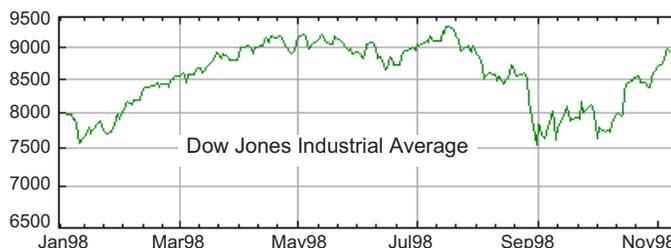
email: trout@tamasset.com  
Web Site: www.tamasset.com

Editor: Jeffrey C. Troutner

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## Markets Update Wednesday, November 10, 1998

As the chart below illustrates, large U.S. stocks have clawed their way back toward the high reached in mid-July. Small company stocks have also recovered (at a faster pace than large company stocks lately), but are still down year-to-date. Foreign stock returns remain positive for the year.



## The Retirement Calculator from Hell

William J. Bernstein, *The Efficient Frontier* ([www.efficientfrontier.com](http://www.efficientfrontier.com))

Most of you have seen the nifty retirement software available from the likes of Vanguard and T. Rowe Price which provides the mathematical muscle to help you plan your retirement. Input your retirement age, expected lifespan, required annual income, rate of inflation and investment return, and hey presto, you find out that to avoid a golden years diet of Alpo you need the GDP of the average Central American republic.

Problem is, it may quite possibly be worse than that. These calculators all make the same erroneous assumption—that your expected rate of return is the same each and every year. In other words, let's assume that the real (inflation adjusted) rate of return of the S&P 500 will be 7% in the future. You might conclude that you can withdraw an inflation adjusted \$70,000 of your \$1,000,000 Vanguard Index Trust 500 IRA each and every year indefinitely, and maintain yourself with the same real income in the long run. And you'd be wrong.

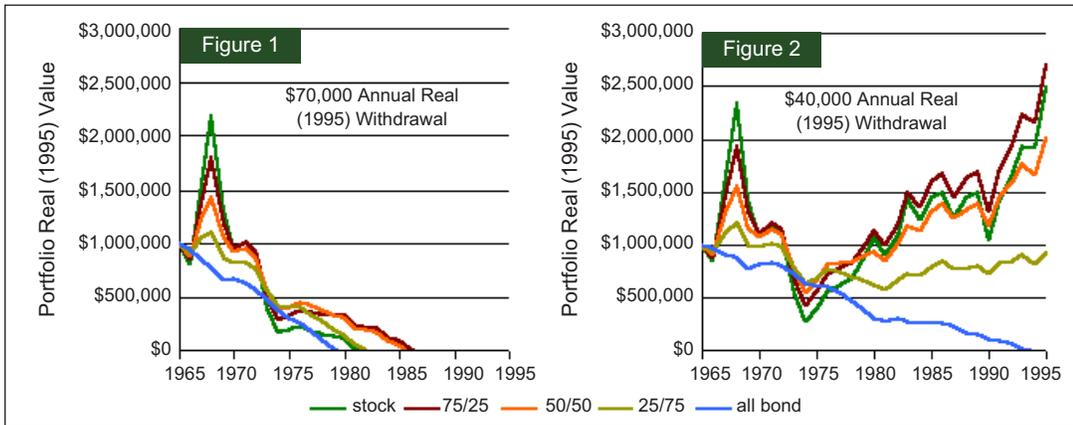
It turns out that if you have rotten returns in the first decade you will run out of money long before reversion to the mean saves your bacon in later years. To illustrate, let's use the past as a rough guide. What would happen if the day you retired marked the beginning of a long, brutal bear market, say on January 1, 1966, and you lived for another 30 years, until 12/31/95? For the first 17 years (1966 to 1982) the return of the S&P 500 was a paltry 6.8%. By gruesome numerical coincidence, this was identical to the rate of inflation for the period, making the *real* stock return for the whole 1966-82 period zero. The return for the next 13 years (1983-95) was spectacular, bringing the real return for the whole 30 year 1966-95 period up to 5.3%, not too far below the historical norm of 7%.

I next constructed an all equity portfolio consisting of 80% S&P 500 and 20% US small stocks, and mixed this with 5-year Treasuries. I assumed that one began the period with \$1,000,000 and then calculated results of various withdrawal rates from the following mixes: 100% stock, 100% bond, and 75/25, 50/50, and 25/75 mixes of both. The results are plotted below. Again, it is important to realize that the amounts on the y axes are in inflation adjusted 1995 dollars. This is the simplest and clearest way of performing retirement calculations.

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First, let's look at withdrawing 7% of the initial amount, or \$70,000 (inflation adjusted), per year. As you can see in Figure 1, this is an unmitigated disaster, particularly for the all stock portfolio. All five portfolios run out of money, with the 75/25 and 50/50 portfolios lasting the longest. The great bull market beginning in 1984 came far too late to save even the most patient investor.



At \$60,000, only the 75/25 portfolio comes out with even a fraction of the corpus intact, and the 50/50 portfolio barely keeps in the black by the ending period. The other three portfolios lead straight to the alms house.

Only at \$50,000 and \$40,000 withdrawal rates (Figure 2), do things look a little less grim. The best strategy at a \$40,000 withdrawal rate is the 75/25 mix, which handily survives the 30 year period. However, even this route was one wild ride. Beginning with a \$1,000,000 real value in 1966, it rose to a real \$1,943,000 in 1968, fell to a real \$421,000 in 1974, rising again to a real \$2,706,000 by the end of 1995.

What devastates the above scenarios is the withdrawal of a predetermined inflation adjusted stipend from a portfolio already ravaged by the market. What happens if instead we withdraw a fixed *percentage* (as opposed to a fixed amount) of our principal? In other words, if we start with a nest egg of \$1,000,000, and withdraw 7% each year, we will begin withdrawing at a rate of \$70,000 per year. If our principal then falls 50%, we are left with only \$465,000, so we can now only

withdraw payments at a rate of  $.07 \times \$465,000 = \$32,550$  per year. This approach has the advantage that we never run out of money, although the stipend amount will fall dramatically in some years. I've plotted annual income for 5% and 7% constant percentage withdrawals above. Whereas the plots in Figures 1 & 2 showed the real residual portfolio wealth after

constant real withdrawals, the plots in Figures 3 & 4 show the annual stipends from a *constant percentage* withdrawal.

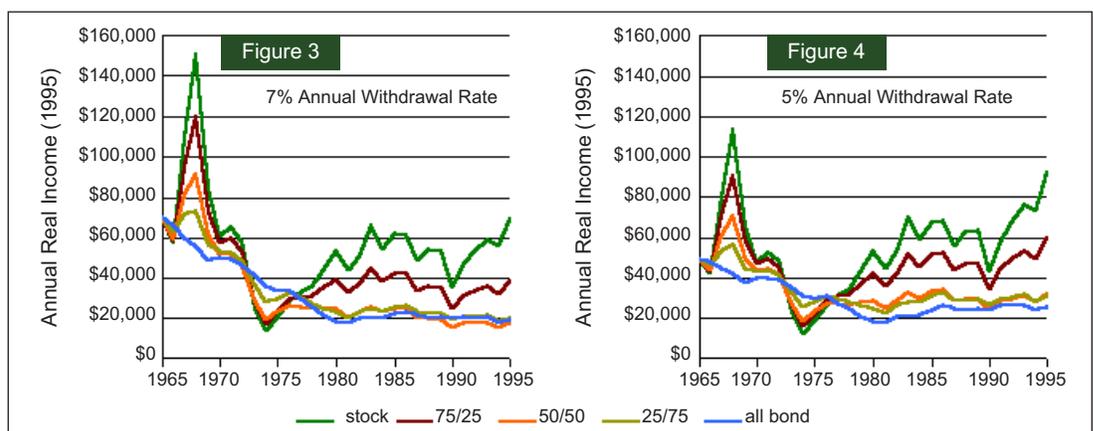
Note that for a constant percentage withdrawal the all stock portfolio does better than the mixed portfolios. This is because one is effectively "value averaging" into a falling market by reducing one's withdrawals when stock prices are low. If one is

willing to tolerate a stipend amount which dramatically fluctuates with market conditions, then one can indeed withdraw 7% per year from an all stock portfolio in the long run. This strategy is not for the faint of heart. It produced a real \$70,000 income in 1966, which rose to a real \$151,000 in 1968, fell to a real \$13,700 in 1974, rising back to a real \$69,000 by

the end of 1995.

Although historical market analogizing can be both embarrassing and dangerous to one's wealth, today's market looks an awful lot like 1966. It would behoove anybody with an investment horizon stretching another 30 years to consider the 1966-95 as a useful reality check.

One point cannot be made often enough—when you retire, are you going to be withdrawing a *fixed inflation adjusted amount* on a regular basis, or are you going to be withdrawing a *fixed percentage* of your portfolio? This is not a semantic fine point. If you need a fixed amount, plan on withdrawing no more than about 4.5% of your starting amount in inflation adjusted terms. A fair dollop of bonds won't hurt in this situation.



If you can be more flexible and spend a fixed percentage of your nest egg each year, then you can indeed keep your entire retirement stash in stocks and spend 7% annually. Just remember that your stipend will likely fluctuate wildly over the decades of your retirement. Keep a few cans of Alpo in the cupboard if you decide to go this route.