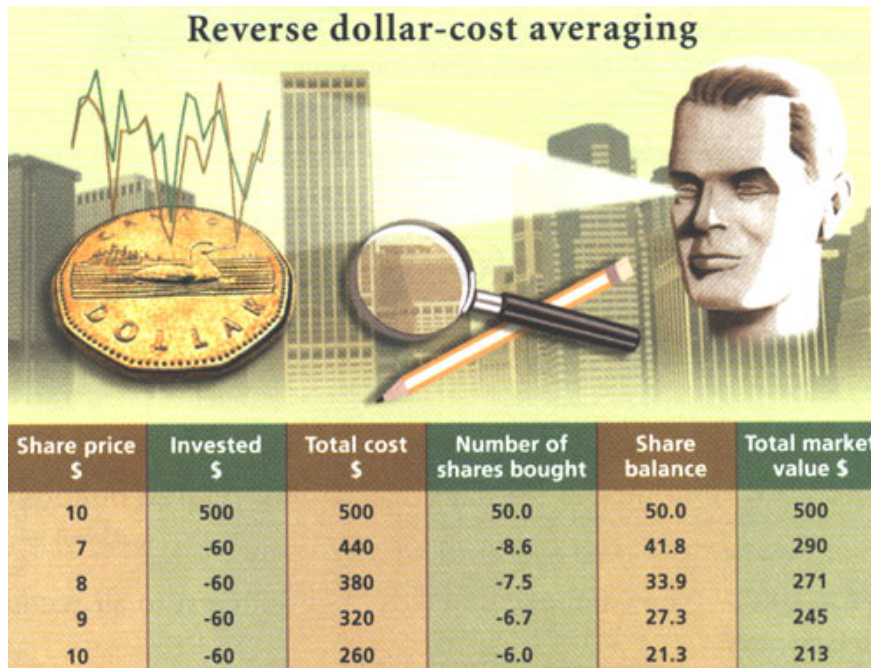# Unveiling the myth

By Jim Otar
*Illustration: John Sapsford*

**WITH THE RIGHT RETIREMENT PLANNING MODELS, YOU CAN GIVE
REALISTIC PROJECTIONS TO YOUR CLIENTS**

Reverse dollar-cost averaging

Share price $	Invested $	Total cost $	Number of shares bought	Share balance	Total market value $
10	500	500	50.0	50.0	500
7	-60	440	-8.6	41.8	290
8	-60	380	-7.5	33.9	271
9	-60	320	-6.7	27.3	245
10	-60	260	-6.0	21.3	213

Financial planners use retirement planning software to prepare projections of asset values into future years. In doing so, they input such assumptions as investing periodically, retiring at a certain age, withdrawing a certain amount of income from this portfolio after retirement, inflation and portfolio performance. Similar retirement calculators are available from financial institutions. For the do-it-yourselfers, plenty of websites exist offering calculators.

These calculators produce a graph showing projected asset growth over time. Typically it may look like figure 1. In our example, we used a 6% initial withdrawal rate (i.e., you have $1 million at the beginning of your retirement and withdraw $60,000 in the first year, adjusted for inflation in subsequent years).

FIGURE 1

Portfolio value
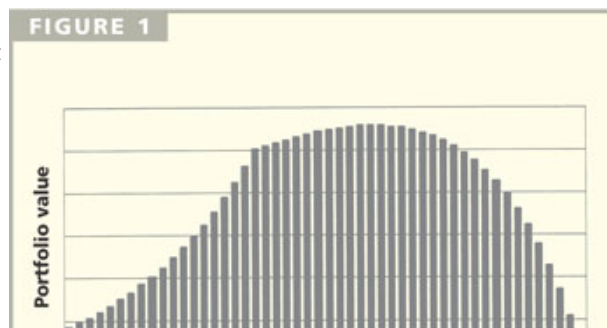
Typically financial plans have one thing in common: they use an average steady growth over the planning period. There is no account for market fluctuations, a shortcoming handled by saying you have to review your plan every year and revise it as required. There is also a disclaimer attached to each plan, which should reduce or remove any liability to the planner. Nevertheless, after reviewing such a plan, you are relieved you will have sufficient retirement savings and you are confident about your retirement planning.

Let's make two small changes to our assumptions and see what happens. Instead of assuming a steady state growth rate (we assumed 8% over annual growth rate, which is the average growth rate of Dow Jones industrial average between 1900 and 1999) we will use the actual stock market history. And instead of 3.5% average inflation rate, we use the actual inflation rate. Furthermore, let's assume we have a balanced portfolio of 60% fixed income and 40% equity. We assume the equities yield 1.5% dividend, and we rebalance this portfolio each year.
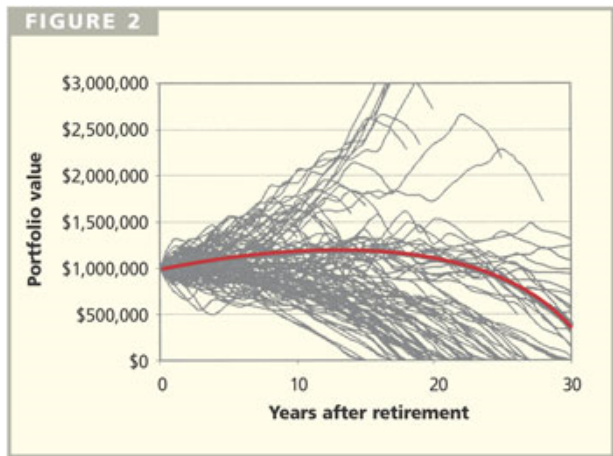

FIGURE 2

In figure 2, the entire horizontal axis covers 30 years of time horizon. The red line shows the projection of our portfolio value over time based on our standard retirement plan after retirement. It looks great. Now take a look at the black lines on the chart: each line represents the portfolio value if you were to retire in 1900, 1901, 1902, right to 1999. There are 70, 30-year time periods in 100. It is interesting to note that after 30 years in only nine times out of 70 did the real life portfolio beat the standard retirement plan projection. In 61 times out of 70, or 87% of the time, the standard retirement plan was too optimistic.

Could it get worse? Yes, if you are holding average mutual funds on the equity side of your portfolio. If you were holding average equity funds, after 15 years, your portfolio never outperformed the standard retirement plan. In all cases, your standard retirement plan was too optimistic.

You may think that by taking higher risk you may improve the picture. This also turns out as wishful thinking. Figure 3 shows the retirement projections for an all-equity portfolio from 1900 to 2002. Unfortunately, this doesn't improve the situation. If you were holding an all-equity portfolio, your portfolio managed to beat the standard retirement plan projections in only eight times out of 70 after 30 years. Again, in 89% of the cases, the standard financial plan was too optimistic. In the worst case, you would be broke after only six years. It is certainly a high price to pay for extra hope.

FIGURE 3
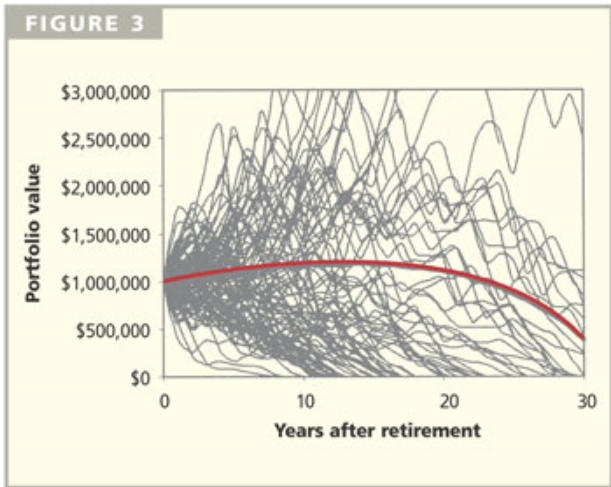
The pattern is similar for different initial withdrawal rates between 2% and 10%, various asset mixes, equities outperforming the underlying index between +4% and -4%, and

rebalancing at different time intervals. In the final analysis, the standard steady growth model overestimates the portfolio life by 85% to 90% of the time.

To understand why the straight-line model is so far from historic reality, we have to look deeper into how markets work on retirement portfolios. We have to differentiate between what affects the market value of a portfolio (the vertical axis) and what affects the longevity of a portfolio (the horizontal axis).

Other than the withdrawal rate, three factors influence the market value of a retirement portfolio: megatrends, market cycles, and random fluctuations.

There are three factors that influence the longevity of a retirement portfolio: the timing of starting the retirement relative to the market cycle; reverse dollar-cost-averaging; and inflation. However, unless cash is taken out of the portfolio periodically, factors that influence the market value have no effect on the portfolio longevity.

Megatrends and market cycles
Stock markets do not grow in a straight line. Neither do they move at random in the long term. Since 1854, an average business cycle lasted 53 months. The average bull market was 35 months and the average bear market was 18 months. Between 1945 and 1991, the average bull market was 50 months and the average bear market was 11 months.

To make matters worse, there is also a phenomenon known as megatrend. An extended bull or bear market that is unusual in its severity or longevity is a megatrend. In the past century, we have had three megabull markets. Two of these markets started after the end of the world wars, and the third megabull market started in 1982 - that is after the Cold War showed signs of coming to an end.

A megabear market followed each of the first two megabull markets. We have yet to see if the bear market that developed after 1999 unfolds into a full-scale mega-bear market. Each generation of investors experienced at least one megabull market followed by a megabear market in their lifetime in the past century. (I don't think our generation will receive, or deserves, a more favourable treatment from the markets this time compared with previous generations.)

Megabear markets can have a devastating effect on retirement portfolios. First, periodic asset rebalancing will speed up depletion of the portfolio; second, the retiree won't have the means to replenish the losses; and third, the time horizon (i.e., the remaining life expectancy of the retiree) may be too short to allow for a meaningful recovery.

In order to understand the effect of a bear market on a retirement portfolio (defined as an investment portfolio with regular, periodic withdrawals), we need to look at the concept called "reverse dollar-cost averaging."

Reverse dollar-cost averaging
Let's say you hold an investment that goes through a bear-market cycle. The share price first goes down and then goes up. In this example, you initially invest $500 and periodically withdraw $60. Initially, the share price is $10. During the bear market the share price goes down. From there, it gradually recovers back to $10. (See table above.)

How much is the loss? Because we had to sell more shares when the price was low for the same $60 periodic withdrawal, when the price went back up to $10, we had fewer shares to participate in the rise. At the end of the cycle, we read from the last line that our total cost is $260, the total market value is $213, and therefore net loss due to reverse dollar-cost averaging is a whopping 18.1%.

Granted, this particular example may be somewhat extreme. However, it is easy to see that a good portion of a retirement portfolio can be depleted, because an average retiree, in all likelihood, will endure three or four bear markets during his or her retirement.

Starting the retirement
The timing of the start of the retirement relative to a market cycle has one of the largest influences on the portfolio life. Starting with the same portfolio, it is not unusual to lose 35% to 40% of the portfolio life if one retires at the beginning of a bear market instead of a bull market.

Inflation
You may have some control over when you retire with respect to market cycles, or you may

work part time for a few years after your retirement. But years later, when you don't have these choices, this is when inflation hits you. It is at this time that you are most vulnerable.

Inflation can be a real portfolio buster in two ways. Initially, you withdraw more and more from your investments to meet your increasing living expenses. Then, to fight inflation, central banks occasionally increase short-term interest rates. This invariably pushes down the share prices, which in turn reduces the value of your investment. In the final analysis, not only do you end up withdrawing increasingly larger amounts from your investments, but you do so from a shrunken asset base.

Consider a retiree with an asset mix of 60/40 fixed income/equity, 6% initial withdrawal rate, and 2% dividend yield at the beginning of the market crash of 1929. It is surprising that this investor's retirement portfolio lasted for a longer time (19.7 years) than had he or she retired at the beginning of 1966 (16.7 years) because of the high inflation rate between 1966 and 1982. When a retirement projection shows a sharp decline in portfolio value in its final years, it is almost always because of inflation, not market cycles.

By using an average, straight-line rate of inflation in existing retirement models, it leads to an overestimation of the portfolio longevity. However, there is not much one can do other than to hope that in the future, the central banks continue to keep inflation in check. Other remedies for a retiree may be to hold some inflation-linked bonds and some hard-assets.

In addition to cyclical megatrends and market cycles, share prices fluctuate randomly. Simulations using the market-cycle model showed that random fluctuations increased the portfolio life by as much as 9.4%, and at worst it decreased it by 7.5%. So random fluctuations, although not a large contributor to the longevity of your portfolio, do make a difference.

Simulation model

Some more recent financial plan models are based on the Monte Carlo simulation. Unlike the straight-line model, the Monte Carlo model adds randomness into the straight-line growth. There are several ways of generating randomness.

While Monte Carlo models can work well with random fluctuations, they do not handle the effects of market cycles. To circumvent this, the range of randomness is increased to a point where it broad-brushes all cyclical market moves. Doing so only covers up this difficulty. Also, it does not solve the underlying shortcoming: Monte Carlo simulation is based upon statistical randomness around a straight-line trajectory. But in the long term, markets are neither random, nor do they follow a straight path.

(I have difficulty with using filtered statistical data of 70 years to project 40 years of retirement. It is probably too short of a history for too long of a projection.)

We developed a new model called the "market-cycle model." Our market-cycle model divides the steady growth rate into a series of two legs: the bull market and the bear market. Each of these legs is based on its own average historic performance and duration. These zigzagging building blocks handle the consequences of markets cycles and reverse dollar-cost averaging in a retirement portfolio significantly better than the straight-line model. Our market-cycle model consists of 16 quarters of bull market followed by four quarters of bear market to approximate the historic average.

Subsequently, we incorporated the historic market data into our market cycle model and called this improved model the "true market model." It is a complete retirement model that addresses the effects of market cycles, reverse dollar-cost-averaging, megatrends, inflation and random fluctuations. Now, we can give realistic projections to our clients. A simplified version of this model is available at www.retirementoptimizer.com.

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