Determinants of Growth in Distribution Portfolios: A Non-Gaussian Analysis

A White Paper from Aftcast.com

Disclaimer: Throughout this paper, terms "successful", "unsuccessful", "failure", "certainty" and any similar words refer only to statistical outcomes of the market history since 1900. Future outcomes will likely be different.

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Executive Summary:

We originally wrote extensively about determinants of portfolio growth in "Unveiling the Retirement Myth – Advanced Retirement Planning based on Market History", a 525-page textbook[i] published in 2009. There, it was spread over eight chapters. This whitepaper combines and updates that into a more concise format.

All calculations are updated to reflect the market history until end of 2010. The background information, our calculation methodology and our findings are described in the following pages.

We did not include any tax consequences in our analysis. We only looked at portfolio performances, excluding tax implications, if any.

Summary of Findings:

In our analysis, we use the entire 111-years of market history starting in 1900 and ending at the end of 2010. We include effects of asset allocation, as well as other factors such as withdrawal rates, the effect of sequence/volatility of returns, inflation, rebalancing frequency, portfolio costs and the potential alpha that might be produced by better management of investments.

The methodology and basis of these conclusions are described in the following pages. In our aftcasting, the equity proxy for the entire analysis is the S&P500 index return. Fixed income net returns (after all expenses) are historical 6-month CD rate plus 0.5%, which corresponds to approximately a fixed income portfolio of five to seven year maturity.

The most important determinant is the combination of sequence and volatility of returns. The next important factor is asset allocation, especially at lower withdrawal rates. As withdrawal rates increase and portfolio life shortens, the importance of asset allocation diminishes and is replaced by the effect of inflation.

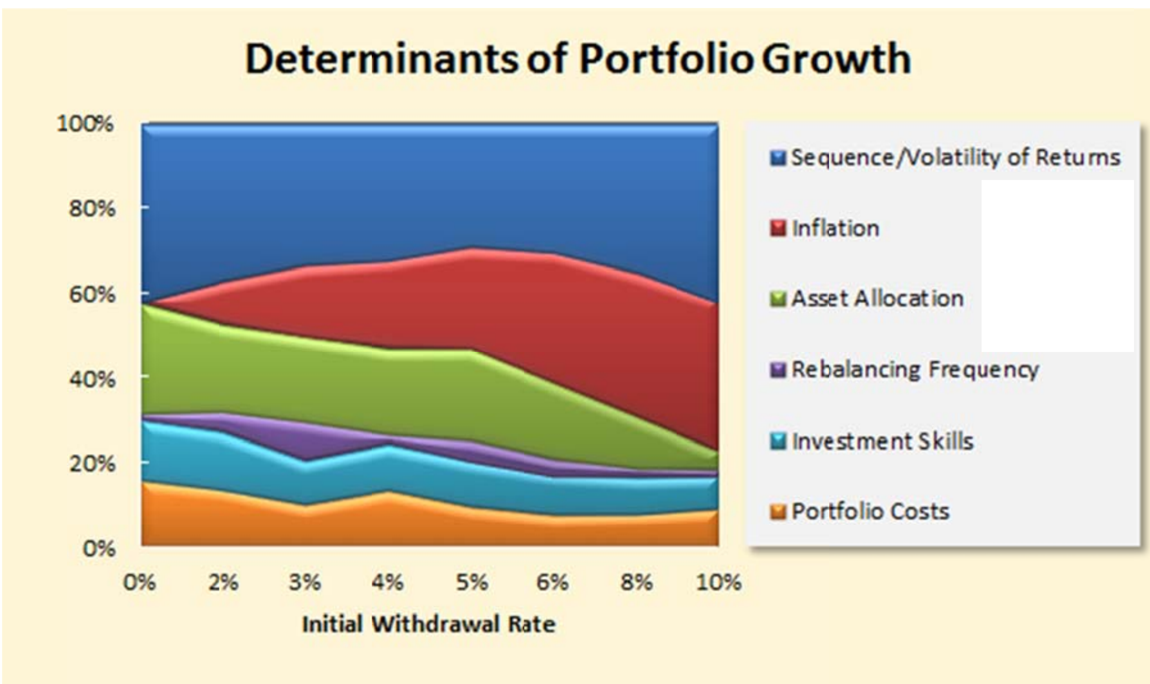
Table 1 and Figure 1 summarize our findings.

Table 1: Determinants of a Distribution Portfolio's Growth

	Initial Withdrawal Rate							
	0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
	Determinants of Portfolio Growth							
Luck Factor:								
Sequence/Volatility of Returns	42%	37%	33%	32%	29%	30%	35%	41%
Inflation	0%	10%	17%	21%	24%	31%	34%	36%
Manageable Factors:								
Asset Allocation	26%	21%	20%	20%	21%	17%	11%	4%
Rebalancing	2%	5%	9%	2%	5%	4%	3%	1%
Fund Management Skills	14%	13%	11%	11%	11%	10%	8%	9%
Portfolio Costs	16%	14%	10%	14%	10%	8%	9%	9%

Note: All figures are rounded.

Figure 1: Determinants of a Distribution Portfolio's Growth



The “Brinson” Study

The first serious look at this topic was the study by Gary P. Brinson, Randolph L. Hood, and Gilbert L Beebower in 1984. In this research, the authors analyzed data from ninety-one large corporate pension plans with assets of at least $100 million over a 10–year period beginning in 1974. In the literature, it is known as the “Brinson Study”. Subsequently, the analysis was expanded to include an additional ten years of data and "Determinants of Portfolio Performance II" was published in the Financial Analysts Journal, January/February 1995.

Their conclusion was that the components of the *difference in success* of a portfolio are: Asset allocation: 93.6%; Security selection 2.5%; Other: 2.2%; Market timing 1.7%.

Since then, many in the financial planning profession try hard to make investors believe that asset allocation is the Holy Grail of investing. When a new account is opened, the first thing a client does is to fill out a risk–assessment questionnaire. Based on the client’s answers, he or she is then pigeonholed into one of four or five investment portfolios. We do not believe that this is the right approach.

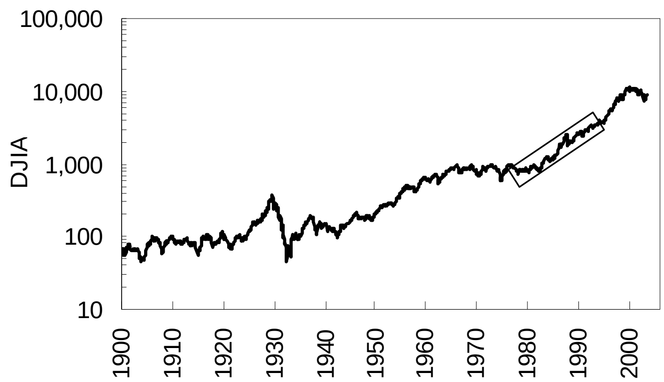
Here is where we see a problem: The findings of the Brinson study cannot be transferred, scaled or applied to individual retirement portfolios for the following reasons:

1. The dynamics of cash flow in a pension fund are entirely different from the dynamics of cash flow in an individual retirement account. When there is a shortfall in a pension fund, then contributions are increased to meet this shortfall. Mathematically, a pension fund is an “open–perpetual” system; an individual retirement account is a “closed–finite” system.
2. A pension fund has a continuous inflow of money over time. In an individual retirement account, inflow of money occurs mainly during working years. After that point, there is no more inflow, but only outflow during retirement years.
3. In an individual retirement account, once the withdrawals start, the effect of “reverse dollar–cost–averaging” becomes important. In a pension fund, since there is a continuous inflow of money too, this effect is insignificant.
4. In an individual account, inflation is important. Withdrawals must be increased over time to maintain the same purchasing power. In pension funds, there is no such concern; as inflation goes up, pension contributions increase as well. This ensures that the effect of inflation is insignificant in the pension account for the cash flow. Also, many pension funds have limits and constraints on how the retirement benefits are indexed. Individual retirees

holding their own saving accounts do not have that luxury; their expenses must be met.

5. The time span of the Brinson study is twenty–years. It is too short; a single secular bullish trend, arguably the “luckiest” 20-year time period over the entire twentieth century. Such a short time frame will miss significant events that are present only in other types of secular market trends.

Figure 2: Time period covered in the Brinson study



Our Approach

The Brinson study is a valuable research work. There is no doubt that asset allocation is important for a pension fund’s success, subject to the limitations mentioned above. However, we believe it is abused by many in the financial industry by extrapolating its findings to individual investment/retirement accounts.

Ideally, the proper asset allocation reduces the *volatility of returns* to an acceptable level, such that its owner stays invested through thick and thin. However, the *sequence of returns* has a far greater impact on the outcome and it is not covered in the Brinson study.

In our analysis, we use the entire 111-years of market history starting in 1900 and ending at the end of 2010. We include effects of asset allocation during that entire time period. In addition, we also include other factors omitted by the Brinson study, such as, withdrawal rates, the effect of sequence of returns, inflation, rebalancing frequency, portfolio costs and the potential alpha produced by better management of investments.

Our analysis does not use any forecasts based on Gaussian averages. We do not use man-made simulators of any kind. We use actual market history which we call "aftcasting".

We call the type of factors that cannot be controlled by the investor, the "luck factor". It has two components: 1. the sequence/volatility of returns and, 2. inflation. Generally, every other factor can be either managed by the investor or by the investment (or portfolio) manager. We call these "manageable factors"

Methodology

The methodology for calculating the contribution of each component is explained in detail below. However, before going into each component, let's review the concept of aftcasting, the engine that provides us with the historical outcomes.

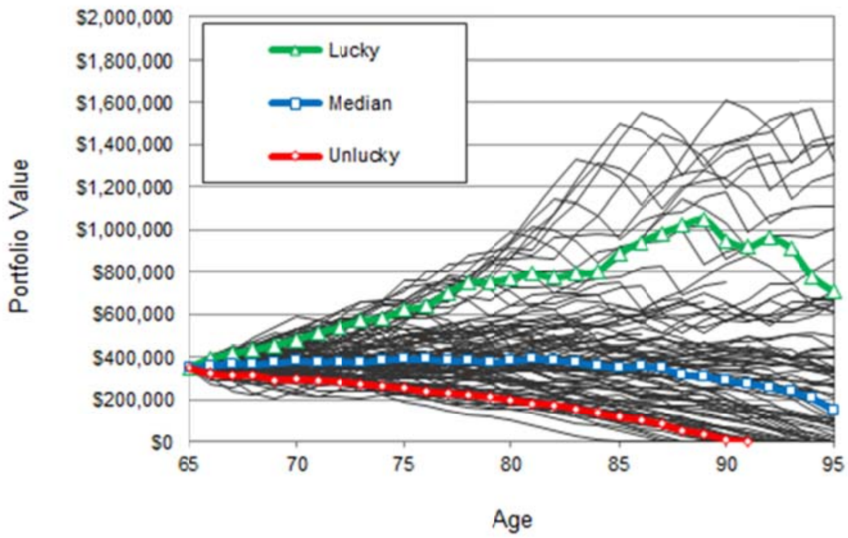
Aftcasting displays the outcome of all historical asset values of all portfolios since 1900 on the same chart, as if a scenario starts in each of the years between 1900 and 2000. It gives a bird's-eye view of all outcomes. It reflects the sequence of returns exactly as it happened in history. It is developed by the author of this whitepaper when writing his original book[ii] on retirement planning in 2001. It provides the success and failure statistics with exact historical accuracy, as opposed to man-made simulation models because it includes the actual historical equity performance[iii], inflation rate[iv] and interest rate[v], as well as the actual historical sequencing of these data sets.

Let's look at an example: Bob, 65, is just retiring. He plans on withdrawing $15,000, indexed annually to inflation, until age 95. His primary concern is sustainability of his income stream for life. In his investment portfolio he has $350,000 with an asset mix of 40% equities and 60% fixed income.

The aftcast of this scenario is depicted in Figure 3. On this chart, we see the thin, black aftcast lines. There is one line starting at the left vertical axis for each year since 1900. There are 40 years of data on each aftcast line for all starting years before 1972. After 1971, each aftcast line ends at the end of year 2010. Thus, there are 3675 data points that reflect the exact, actual market history which is exactly in-line with realistic correlations and patterns of performance of equities, bond yields, interest rates and inflation.

We define the bottom decile of all outcomes as the "unlucky" outcome, the top decile as the "lucky" outcome. The blue line indicates the median outcome where half of the scenarios are better and half are worse. In this example, the probability of depletion by age 95 happens to be 34%.

Figure 3: The aftcast of fixed $15,000 annual withdrawals, indexed to inflation, from an investment portfolio, starting capital of $350,000



Aftcasting does not predict anything. It only shows what would have happened in history. There is no claim or suggestion that past events will be repeated in the future. We are not interested in what happened in a particular year in history, other than in examples. However, we are very interested in the *frequency* and *size* of extreme events that happened in the past in the non-Gaussian reality.

The Sequence/Volatility of Returns

In a distribution portfolio, the sequence of returns is the most important component of the luck factor. It is the direction and persistency of the volatility of returns. Mathematically, it can be defined as the first time-derivative of the volatility of returns.

Let's look at how sequence of returns affects the outcomes over a four year time horizon. We have two scenarios: In the first scenario, the investor is lucky in the beginning; his portfolio grows by 20% in each of the first two years and then declines by 10% in each of the final two years. This is the "good start" portfolio. In the second scenario he is unlucky in the beginning; his portfolio declines by 10% in each of the first two years and then grows by 20% in each of the final two years. This is the "bad start" portfolio.

Table 2: Sequence of Returns

Year	Annual Growth	
	Good Start	**Bad Start**
1	20%	-10%
2	20%	-10%
3	-10%	20%
4	-10%	20%
Average Growth:	5%	5%

In each case, the average annual growth over this four-year time period is identical; it is 5%. Let's see how these scenarios affect the accumulation portfolio. The investor starts with $100,000 initial capital and no money is added to or withdrawn from the portfolio. The table below (Table 3) shows the portfolio value at the end of each year:

Table 3: Sequence of Returns, accumulation

Year	Portfolio Value (initially $100,000)	
	Good Start	**Bad Start**
1	$120,000	$90,000
2	$144,000	$81,000
3	$129,600	$97,200
4	$116,640	$116,640
Total Growth:	16.64%	16.64%

In both scenarios, good or bad start, the total growth during the four-year time period is identical, 16.64%. If no money is distributed, then the sequence of returns has no effect on the final outcome.

Now, let's look at a distribution portfolio. The same investor starts with the same portfolio, experiences the same good-start/bad-start scenarios, but in this case he withdraws $5,000 at the end of each year. Here is the portfolio value at the end of each year:

Table 4: Sequence of Returns, distribution

Year	Portfolio Value (initially $100,000, $5,000 withdrawn at the end of each year)	
	Good Start	**Bad Start**
1	$115,000	$85,000
2	$133,000	$71,500
3	$114,700	$80,800
4	$98,230	$91,960
Total Decline:	1.77%	8.04%

When the investor had a good start, his portfolio's total decline -including his withdrawals- was 1.77% over this four-year time period. When he had a bad start, his total decline over the four-year time period was much larger, 8.04%. This is the effect of the sequence of returns in a distribution portfolio.

What is the difference between the impact of the volatility of returns and the sequence of returns? In essence, the volatility of returns creates "reverse-dollar-cost-averaging" for the portfolio. History shows that this can reduce the portfolio life by up to 20%. However, it can be easily fixed by creating a "cash" bucket, holding about five years of withdrawals in cash-like investments and short-term bonds. When withdrawals are made from this bucket only, then the effect of volatility of returns can be diminished significantly.

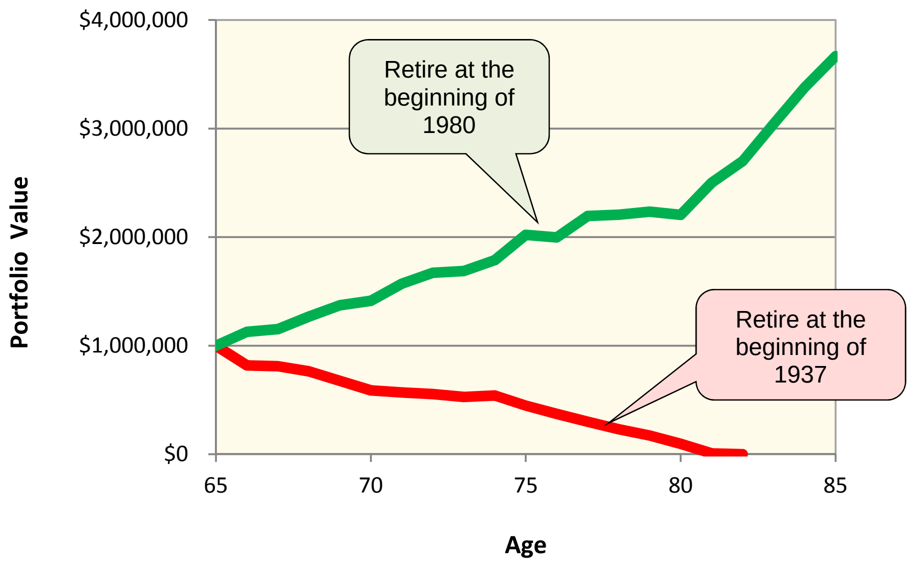
On the other hand, the effect of sequence of returns cannot be reduced with the bucket strategy because, once withdrawals exceed the sustainable amounts, then the time horizon of the *investor* and the time horizon of the *portfolio* disconnect. As a result, losses become permanent and irrecoverable, regardless of how long the investor's time horizon is.

While it is not too difficult to analyze the effects of volatility of returns and the sequence of returns separately, it is beyond the scope of this article. For the purposes of calculating the luck factor, that distinction is unnecessary. Therefore, we combined the sequence and the volatility of returns as a single line item separated by a slash.

Figure 4 depicts the effect of starting retirement in 1937 (unlucky timing) versus 1980 (lucky timing). In both cases, the retiree starts with an initial capital of $1 million, 40/60 asset allocation, rebalanced annually, and the initial withdrawal amount is $50,000 at age 65, indexed to inflation each year.

The lucky investor retired in 1980. At age 85, his portfolio grew to nearly $4 million. The unlucky investor retired in 1937. His portfolio ran out of money at age 81. Since all other factors are identical, the luck factor is the only determinant of this huge difference in the outcome.

Figure 4: The importance of luck with respect to timing of the retirement



How do we calculate the effect of the sequence/volatility of returns in a distribution portfolio? Here are the steps:

1. Isolate and exclude the effect of the variability of inflation from secular trends. We do that by using a fixed "average" inflation rate during retirement. This leaves us with variations in the sequence of returns/volatility only.
2. Calculate the asset value of the portfolio over time for all years since 1900. We define the top 10% of all outcomes as the "lucky" outcome and the bottom 10% of all outcomes as the "unlucky" outcome.
3. Calculate the median outcome, where half of the outcomes are better and half are worse.

4. Calculate the compound annual return (CAR) of the lucky, unlucky and the median portfolios.
5. Finally, the effect of the sequence of returns/volatility is half of the difference between the CAR of the lucky and unlucky portfolios divided by the CAR of the median:

$$LF = \frac{(CAR_{90} - CAR_{10})}{2 \times CAR_{50}} \times 100\% \qquad \text{(Equation 1)}$$

where:

LF is the luck factor

CAR_{90} is the compound annual return of the lucky (top decile) portfolio

CAR_{10} is the compound annual return of the unlucky (bottom decile) portfolio

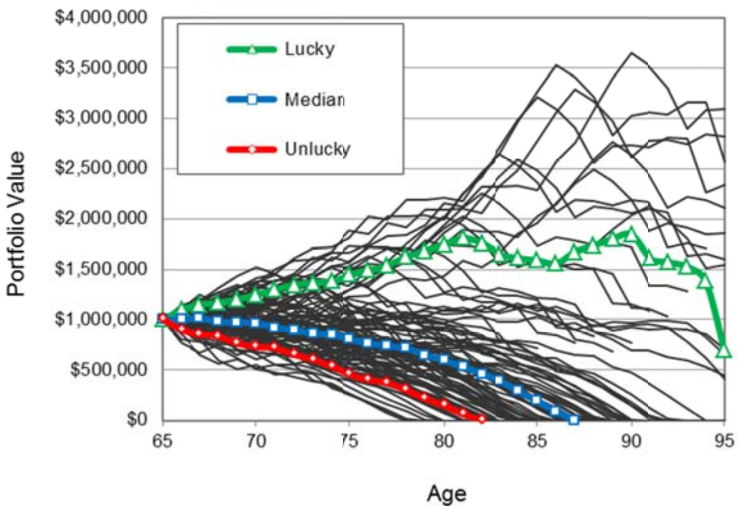
CAR_{50} is the compound annual return of the median portfolio

The luck factor measures the average difference of the compound annual returns between the extreme outcome and the median outcome, expressed in percentage.

Example: 1

Dan is 65 years old, just retiring. He has $1 million in his portfolio and needs $60,000 each year, indexed to inflation. His asset mix is 40% equity and 60% fixed income, rebalanced annually.

On the equity side, he expects the index return. On the fixed income side, he expects a return of 0.5% over and above the historical 6–month CD rates after all management fees. Using 3.2% annual increase of withdrawals to reflect the historical average inflation, we calculate his luck factor resulting from the sequence of returns.



The lucky, unlucky and median portfolios are indicated on the chart. We calculate the compound annual returns for the lucky, unlucky and median portfolios as 8.00%, 2.83% and 5.46%, respectively. Plug in these numbers into Equation 1 and calculate the luck factor resulting from the sequence/volatility of returns:

$$\text{Luck Factor attributable to sequence/volatility of returns} = \frac{8.00\% - 2.83\%}{2 \times 5.46\%} = 47.3\%$$

Similarly, we calculate the luck factor resulting from the effect of sequence/volatility of returns for various withdrawal rates. Table 5 shows the results. In all cases, the asset mix is 40% equity and 60% fixed income.

Table 5: The impact of the sequence/volatility of returns for various withdrawal rates

Initial Withdrawal Rate							
0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Effect on Portfolio Growth Rate							
46.7%	46.3%	46.5%	51.8%	50.2%	47.3%	62.2%	69.1%

Inflation

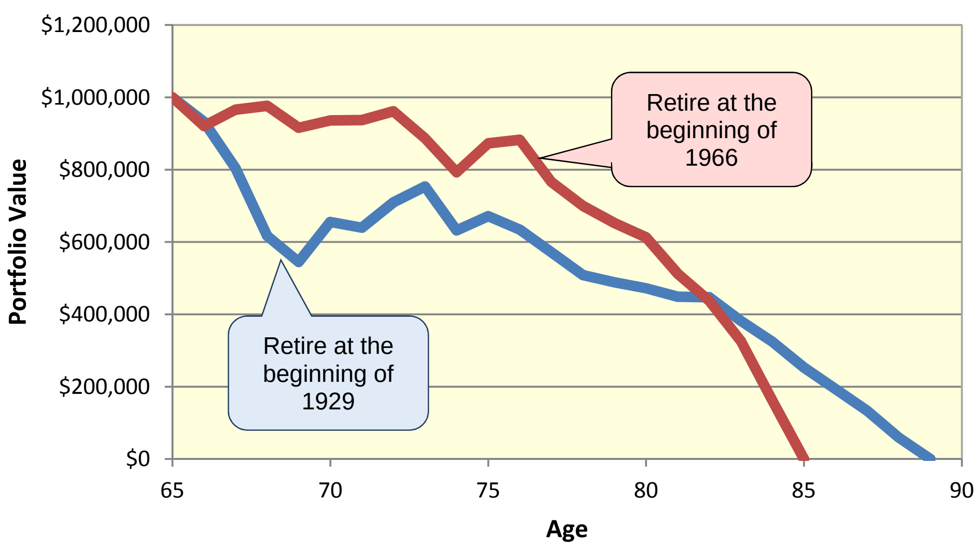
If there are no withdrawals from the portfolio, inflation has no direct impact on the success of a portfolio[vi]. Its effect increases as withdrawal rates increase. It is the second most important component once the withdrawal rate exceeds 5%.

It forces a retiree to withdraw higher and higher amounts from his portfolio, just to keep his purchasing power the same. Many times, this depletes retirement portfolios prematurely.

Consider a retiree with an asset mix of 40/60 equity/fixed income and a 6% initial withdrawal rate. Here, we use historical dividend rates and assume no management fees. If he were to retire at the beginning of the market crash of 1929, his portfolio would have lasted until age 89. On the other hand, if he were to retire in 1966, the beginning of a secular sideways market, his portfolio would have depleted at age 85, as shown in Figure 5.

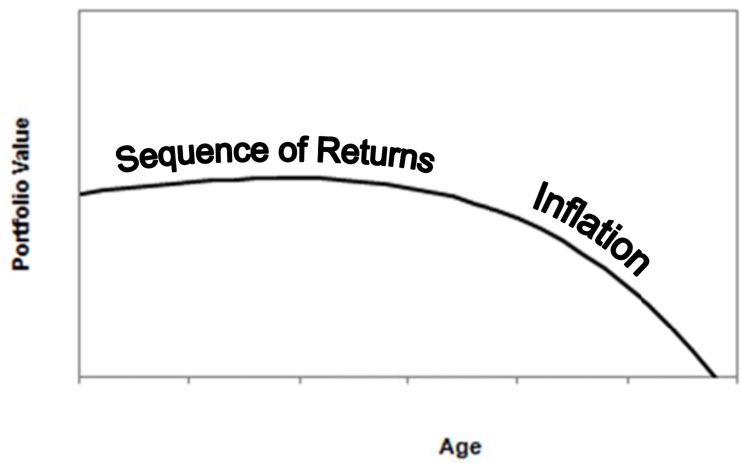
The high average inflation rate between 1966 and 1981 would have forced the retiree to withdraw more and more income, eventually depleting his portfolio. This was worse than the secular bearish trend that started in 1929, when equities lost about 80% of their value.

Figure 5: High inflation can shorten portfolio life more than the worst market crash.



Generally, the sequence of returns impacts the portfolio in the early years and the inflation impacts it in later years. If you see a retirement projection with a sharp decline of the portfolio value after about twenty years, it is almost always because of inflation. If that sharp drop occurs in the early years, it is generally because of the sequence of returns. Figure 6 shows the areas of the standard retirement plan where sequence of returns plays an important role and where inflation plays an important role on portfolio longevity.

Figure 6: Influence of the Sequence of Returns and Inflation on distribution portfolio



How can we calculate the luck factor created by the effect of inflation in a retirement portfolio? It is very similar to calculating the effect of the sequence/volatility of returns. Here are the steps:

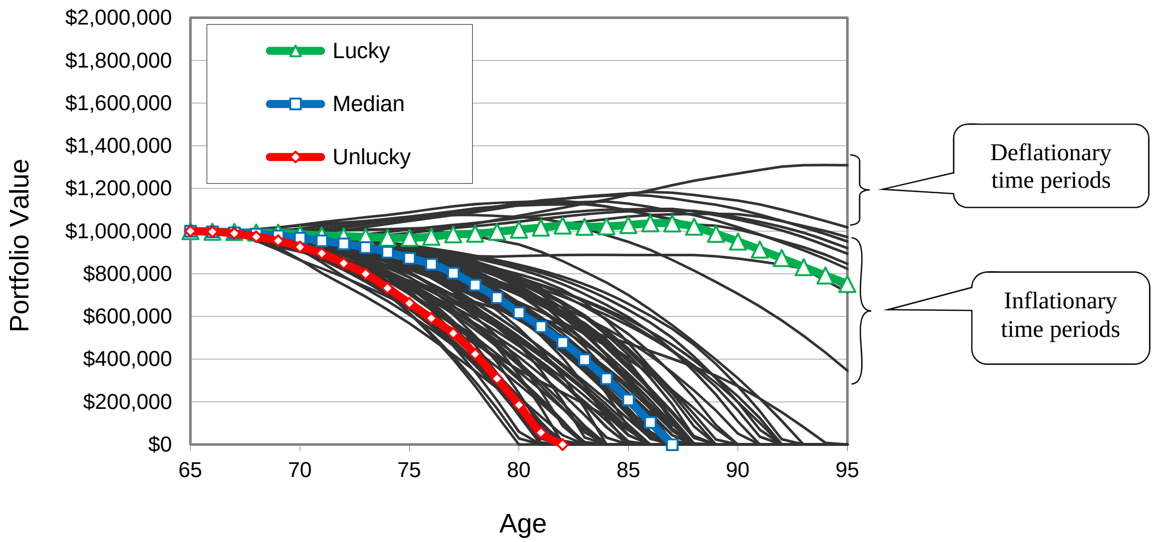
1. Isolate and exclude the effect of the sequence/volatility of returns. We do that by using a fixed "average" portfolio growth rate in the aftcast. This leaves us only with the historical inflation rates that vary from year to year.
2. Calculate the compound annual return (CAR) of the lucky, unlucky and the median portfolios.
3. Calculate the luck factor due to inflation using Equation 1.

Example: 2

Marco is 65 years old, just retiring. He has $1 million in his portfolio and needs $60,000 each year, indexed to inflation. His asset allocation is 40% equities and 60% fixed income, rebalanced annually.

Marco assumes that he will receive the index return, 6.7% (between the years 1900 and 2010) after all management fees. As for the fixed income side, the average return was 5.1% for the same time period.

Therefore, we calculate the average return for a 40/60 asset mix portfolio as 5.74% (40% of 6.7% equity growth and 60% of 5.1% fixed income growth). We use that as the portfolio growth rate and we index withdrawals to actual CPI annually.



The lucky, unlucky and median portfolios are indicated on the aftcast chart above. We calculate the compound annual returns for the lucky, unlucky and median portfolios as 8.04%, 2.77% and 5.50%, respectively. Plug these numbers into Equation 1 and calculate the luck factor that is attributable to inflation:

$$\text{Luck Factor attributable to inflation} = \frac{8.04\% - 2.77\%}{2 \times 5.50\%} = 47.9\%$$

Similarly, we calculate the luck factor resulting from the effect of inflation for various withdrawal rates. Table 6 shows the results. In all cases, the asset mix is 40% equity and 60% fixed income.

Table 6: The impact of inflation for various withdrawal rates

Initial Withdrawal Rate							
0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Effect on Portfolio Growth Rate							
0.0%	12.3%	23.3%	33.2%	40.9%	47.9%	59.2%	59.5%

Asset Allocation

When people cite the Brinson study, they might say something like "asset allocation is the single largest contributor to a portfolio's success. It is much more important than security selection. In fact, one study concluded that asset allocation accounted for over 90% of the difference in a portfolio's investment return."

Here is the reality: Take a 65-year old investor, retiring this year. He wants to plan until age 95. His retirement savings are valued at one million dollars. He needs to withdraw $60,000 each year, indexed to actual inflation. On the equity side, he expects an average of 2% dividend yield, pays 0.5% management fees.

Let's look at how his portfolios would have performed if he were to start his retirement in any of the years between 1900 and 2000. We calculate for six different asset mixes:

Table 7: The impact of asset allocation for various withdrawal rates

Asset Mix (Equity / Fixed Income)	Probability of Depletion by Age 95	Median Portfolio depleted at Age
100% Equity	68%	87
80 / 20	67%	87
60 / 40	74%	87
40 / 60	78%	86
20 / 80	91%	86
100% Fixed Income	95%	87

We see on Table 7 that, neither the median portfolio life, nor the probability of depletion, improved significantly by changing the asset allocation.

With that observation, now we can measure the impact of asset allocation. We figure out the difference in compound annual returns (CAR) of the median portfolio for the asset mix with the best and the worst CAR as described in Example 3.

Example 3

Bob, 65, is just retiring. He has $1,000,000 savings for retirement; he needs $30,000 each year, indexed to inflation. His equities grow the same as the S&P500 index. He rebalances his asset mix annually if equities deviate by more than 3%.

Based on the market history, the compound annual return (CAR) of the median portfolio for various asset mixes are as follows:

	Asset Mix (Equity / Fixed Income)								
	0/100	20/80	30/70	40/60	50/50	60/40	70/30	80/20	100/0
CAR, (median)	4.98%	4.92%	4.98%	5.07%	5.28%	5.41%	5.16%	5.10%	4.22%

For this example, based on market history, the highest growth rate was at 5.41% and the lowest was 4.22%. If Bob makes the worst asset allocation decision, the maximum penalty is a 1.19% difference in CAR in absolute terms. In relative terms, the difference is 28.2%, calculated as 1.19% divided by 4.22%.

Table 8 indicates the impact of asset allocation for various withdrawal rates.

Table 8: The impact of asset allocation on portfolio growth

Initial Withdrawal Rate							
0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Effect on Portfolio Growth Rate							
29.0%	25.9%	28.2%	33.0%	36.8%	27.5%	19.3%	7.2%

Rebalancing Frequency

When it comes to rebalancing, many investment professionals believe often is better. Rebalancing is done –supposedly- to reduce the portfolio volatility. Does frequent rebalancing really decrease volatility? How does this impact portfolio longevity? Let's observe history.

Volatility has two components. The first component is the short–term random fluctuations. Every second, every minute, every day, some event happens somewhere in the world that influences investor psychology. As investors make trading decisions, markets move up or down. If we agree with the notion that price movements within a one year time horizon are mostly random, then we cannot expect a significant reduction in volatility by rebalancing more frequently than annually. So you can rebalance as often as you want, even daily, and that won't reduce the random volatility.

The second component of volatility occurs over the longer term. Markets respond to the collective expectation of investors and a trend forms. Rebalancing can reduce volatility only if it is done after an *observable trend*. Our analysis shows that the 4–year U.S. Presidential election cycle is the shortest market cycle with an observable trend that we can work with. Example 4 shows the impact of rebalancing frequency.

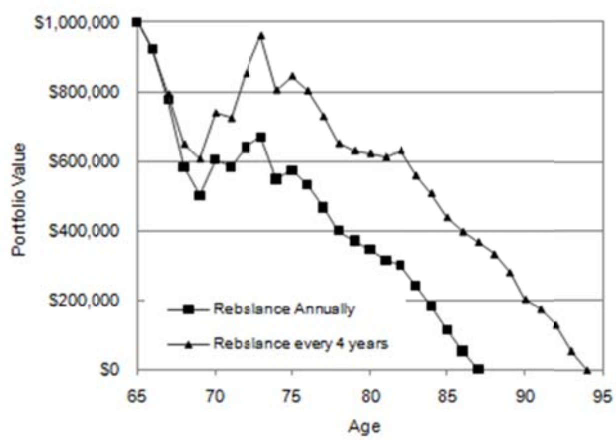
Example 4:

Steve, 65, is retiring this year. He has put aside $1 million for his retirement, 40% equity and 60% fixed income. He needs $50,000 income each year, indexed to inflation. He takes his withdrawal from the fixed income portion of his portfolio.

Let's see the impact of rebalancing for different market trends.

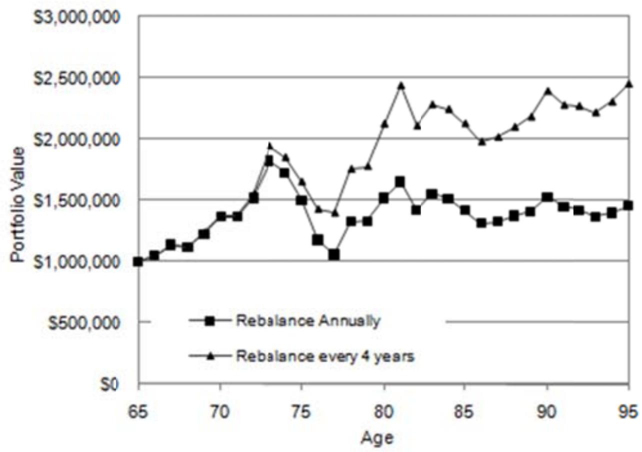
<u>Retiring into a Bearish trend – 1929:</u>

The chart below shows Steve's portfolio value if he had retired at the beginning of 1929, the beginning of a secular bear market. At the market bottom of 1932, Steve's portfolio experienced a smaller loss when rebalanced every four years than if he were to rebalance every year. The portfolio that was rebalanced every four years provided Steve with 28 years of income. On the other hand, if rebalanced annually, the portfolio would run out of money after 21 years. Rebalancing every four years on the Presidential election year increased the portfolio life by a respectable 38%.



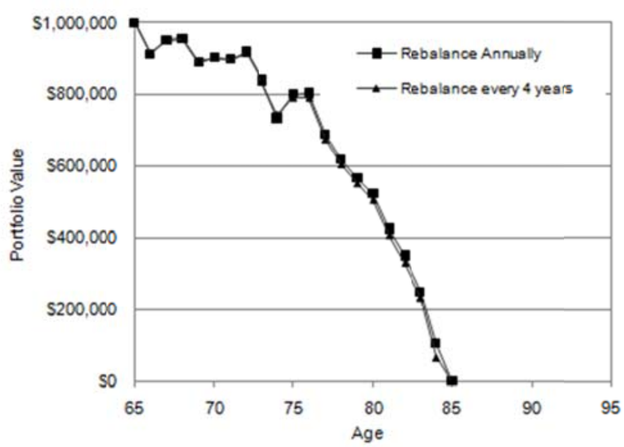
<u>Retiring into a Bullish Trend – 1921:</u>

The chart below shows the portfolio value if Steve had retired in 1921, the beginning of the first secular bull market of the last century. At the end of 30 years, Steve was one million dollars richer if he rebalanced every four years at the end of the U.S. Presidential election year than if he were to rebalance annually. The volatility was about the same for either.



Retiring into a Sideways Trend – 1966:

The chart below shows Steve's portfolio value if he had retired at the beginning of a secular sideways trend that prevailed between 1966 and 1981. It demonstrates that there was no perceivable difference in the portfolio value when rebalanced every four years on the Presidential election year as opposed to rebalancing annually. The portfolio volatility was essentially identical.



The aftcast shows:

- The volatility was about the same whether the portfolio was rebalanced annually or once every four years on the Presidential election year.
- In secular bull markets, rebalancing too often stunted the portfolio growth.
- In secular bear markets, rebalancing too often compounded losses.
- In sideways markets, it did not matter how often you rebalanced. The portfolio life varied slightly at random.

Our analysis shows that rebalancing at the end of each Presidential election year gave the best results because doing so synchronized with the high point of this cycle. Rebalancing at any other frequency or at any other time within the cycle did not add as much value.

We measure the impact of the frequency of rebalancing by observing the difference of the compound annual returns (CAR) of the median portfolios for both annual and Presidential cycle rebalancing scenarios.

For example, at 4% withdrawal rate the CAR of the median portfolio with annual rebalancing is 5.21%. When rebalancing is done once every four years at the end of the Presidential election year, then CAR becomes 5.41%. The impact of using the less frequent rebalancing is 3.8%, calculated as 5.41% less 5.21% divided by 5.21%.

Table 9 indicates the impact of rebalancing frequency on the CAR for a portfolio consisting of 40% equity and 60% fixed income. The rebalancing threshold is 3%, i.e. rebalancing occurs only if the asset mix deviates by more than 3%.

Table 9: The impact of rebalancing frequency on portfolio growth at various withdrawal rates

Initial Withdrawal Rate							
0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Effect on Portfolio Growth Rate							
1.9%	6.1%	12.2%	3.8%	8.5%	5.9%	5.8%	2.2%

Keep in mind; while the impact of rebalancing frequency might seem small for the median portfolio, it has a much larger positive impact in extreme market events.

Fund Management Skills - Added Alpha

While it is rare, exceptional fund managers can outperform the market. This excess return over and above the index return is called alpha. In our analysis, we use an alpha of 2%. We are not suggesting that a skillful manager can outperform the index by 2% year after year; but we use that as a possible upper limit for calculation purposes.

We first calculate the compound annual return (CAR) of the median portfolios first with alpha equal to zero. Then, we do the same with alpha equal 2%. The asset mix is 40% equity and 60% fixed income. The impact of added alpha by observing the difference of the compound annual returns, expressed as a percentage.

For example, at 4% withdrawal rate the CAR of the median portfolio with index return is 5.21%. When alpha is increased to 2%, then CAR becomes 6.13%. The impact of added alpha is 17.7%, calculated as 6.13% less 5.21% divided by 5.21%.

Table 10 indicates the impact of fund potential management skills on the CAR.

Table 10: The impact of outperforming the index by 2%

Initial Withdrawal Rate							
0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Effect on Portfolio Growth Rate							
15.7%	16.8%	14.8%	17.7%	18.1%	15.1%	14.8%	14.0%

Portfolio Costs

Portfolio expenses can significantly reduce portfolio longevity or impede its growth over the long term. Prior to retirement, even though you might assume that you are in the accumulation stage, portfolio costs are “de facto” withdrawals. Like inflation, its effect is not readily apparent in a short period of time, but it adds up over the long term.

For the purposes of our analysis, we will roll all portfolio costs into a single fixed rate percentage. We use 1.5% of the value of equity holdings as portfolio costs. This includes everything; management fees, trading costs, portfolio expenses, commissions, account fees, and so on. If your portfolio costs are higher than this, the impact will be higher. If they are lower, then the impact will be lower.

We first calculate the compound annual return (CAR) of the median portfolios first with alpha equal to zero. Then, we do the same with alpha equal -1.5% to reflect the portfolio costs on the performance. The impact of portfolio costs is the difference of the compound annual returns, expressed as a percentage.

For example, at 4% withdrawal rate the CAR of the median portfolio with index return is 5.21%. When portfolio costs are deducted, then aftcast shows the CAR of the portfolio as 4.07%. The impact of portfolio costs is 21.9%, calculated as 5.21% less 4.07% divided by 5.21%.

Table 11 indicates the impact of portfolio costs on the CAR for a portfolio consisting of 40% S&P500 and 60% fixed income.

Table 11: The impact of paying 1.5% portfolio costs for the equity holdings

Initial Withdrawal Rate							
0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Effect on Portfolio Growth Rate							
17.7%	17.3%	14.4%	21.9%	17.3%	12.7%	15.0%	15.6%

Determinants of a Portfolio’s Growth

Now, we can combine all these factors to calculate the determinants of a portfolio’s growth. First let’s summarize all factors that we have calculated so far in single table, Table 12:

Table 12: The summary of impact on a portfolio's growth for various withdrawal rates

	Initial Withdrawal Rate							
	0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
	Effect on Portfolio Growth							
Luck Factor:								
Sequence/Volatility of Returns	46.7%	46.3%	46.5%	51.8%	50.2%	47.3%	62.2%	69.1%
Inflation	0.0%	12.3%	23.3%	33.2%	40.9%	47.9%	59.2%	59.5%
Manageable Factors:								
Asset Allocation	29.0%	25.9%	28.2%	33.0%	36.8%	27.5%	19.3%	7.2%
Rebalancing	1.9%	6.1%	12.2%	3.8%	8.5%	5.9%	5.8%	2.2%
Fund Management Skills	15.7%	16.8%	14.8%	17.7%	18.1%	15.1%	14.8%	14.0%
Portfolio Costs	17.7%	17.3%	14.4%	21.9%	17.3%	12.7%	15.0%	15.6%

Figures on this table indicate the percentage of impact on the growth rate caused by each factor alone. In other words, if you total each column, they do not add up to 100%.

To calculate the relative importance of each factor, we prorate these figures so that each column adds up to 100%. Table 13 shows the relative contribution of each factor for different initial withdrawal rates. Figure 7 depicts the same in graphical format.

We observe that, by far, the most important factor across all withdrawal rates is the sequence/volatility of returns. The next important factor is asset allocation, especially at withdrawal rates below the sustainable. As withdrawal rates increase and portfolio life shortens, the importance of asset allocation diminishes and is replaced by the effect of inflation.

At withdrawal rates larger than the sustainable amount, the impact of the luck factor exceeds 50%. This leads us to conclude that:

- if the sustenance of retirement income is your prime objective,
- if withdrawal amounts are larger than sustainable[vii], and
- if hoping for good luck is not your retirement strategy

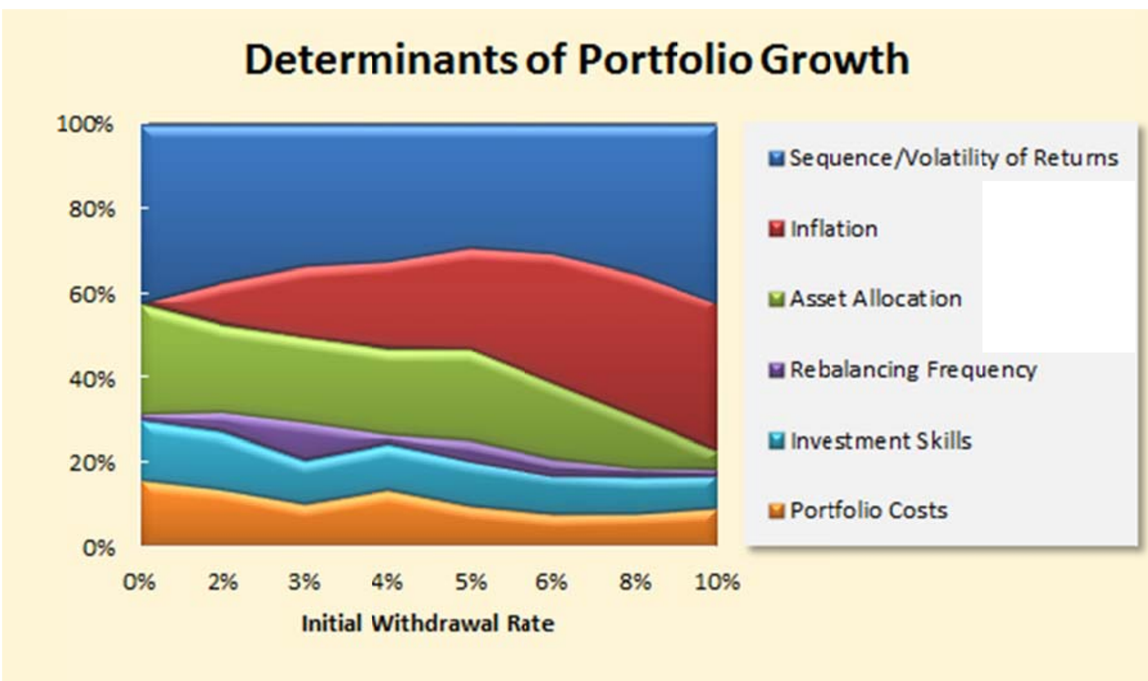
then don't expect that asset allocation and/or diversification will make much of a difference on the outcome. You need to take one or more of the following actions: delay retirement, spend less, work part-time during retirement, rent part of your home, downsize your home, reduce portfolio costs, stop giving money away, buy life or variable annuity with lifelong income guarantees.

Table 13: Determinants of a portfolio's growth for various withdrawal rates

	Initial Withdrawal Rate							
	0%	**2%**	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
	Determinants of Portfolio Growth							
Luck Factor:								
Sequence/Volatility of Returns	42%	37%	33%	32%	29%	30%	35%	41%
Inflation	0%	10%	17%	21%	24%	31%	34%	36%
Manageable Factors:								
Asset Allocation	26%	21%	20%	20%	21%	17%	11%	4%
Rebalancing	2%	5%	9%	2%	5%	4%	3%	1%
Fund Management Skills	14%	13%	11%	11%	11%	10%	8%	9%
Portfolio Costs	16%	14%	10%	14%	10%	8%	9%	9%

Note: All figures are rounded.

Figure 7: Determinants of a portfolio's growth for various withdrawal rates



About Aftcast.com

Aftcast.com provides research to its clients in the area of distributions. The research is based on non-Gaussian philosophy using actual market history. It helps its clients to better understand the behavior and impact of various distribution strategies.

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

For your comments and feedback, or to learn more about aftcasting, please visit www.aftcast.com or send an email to jim@retirementoptimizer.com

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[i] Otar, Jim, “Unveiling the Retirement Myth”, 2009

[ii] Otar, Jim, “High Expectations and False Dreams”, 2001

[iii] The annual data of the Standard and Poor Composite Stock Price Index started in 1871. S&P index was established in 1926, including 90 large cap stocks and later in 1957 it was changed to hold 500 stocks. In our calculations, we used the annual index data from the tables in Chapter 26 of Robert J. Shiller’s book “Market Volatility”, the MIT Press, ISBN 978 0262 691512” and from the Standards and Poor’s Public website, https://www.sp-indexdata.com

[iv] Annual inflation: U.S. Bureau of Labor Statistics, wholesale price index for the years between 1900–1913, the consumer price index after 1913

[v] Interest Rate: 1900–1987, courtesy of “Market Volatility”, by Robert J. Schiller, MIT Press, [1997], page 440–441, data series 4, recent history from mortgage-x, mortgage information service, http://mortgage-x.com

The fixed income rate used in this analysis is the historical 6-month CD rate plus 0.5% yield premium, net after portfolio expenses. This represents approximately a bond portfolio with about five to six-year average maturity, held until maturity (no capital gains/losses)

[vi] Historically, high inflation is associated with secular sideways trends. Therefore, there is an indirect impact for both accumulation and distribution portfolios. However, it is outside the scope of our analysis.

[vii] We currently calculate the sustainable withdrawal rate to be about 3.3% at age 60, 3.6% at age 65, 4% at age 70, 4.5% at age 75 if the plan is designed to provide income until the age at which the probability of survival is 10% or less.