There Is Always A Better Retirement Fund

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Let's start with the basic fact that you need a worthwhile retirement fund. Furthermore, it better be large enough to sustain you in style with all the comforts of living for another 40+ years after you retire.

Life expectancy is expanding. More than half the children below five today will reach 100 years old.

A retirement fund can also be a legacy to your children so they can get a better life for themselves and their children.

If you "do" make it to retirement age (and your odds are highly likely you will), you definitely will "need" that retirement fund. By then, it will not be a wish that you should have done something about it; it will be a reality that nothing was done to secure your future financially.

You might think: "Oh, my company or government pension plan will take care of that, so maybe I won't need to set up a separate retirement fund". I would not count on a government pension plan since when it will be your time to retire, those pension plans will be taxed more and more and might result in barely enough to get by. That would also be on the condition that the government pension plan will still be solvent in 20+ years.

Nonetheless, should you consider that your company or government pension plan will be more than sufficient to cover all your living expenses, there might be no need for you to read the rest of this article.

In textbfThere Is Always A Better Retirement Fund, I will explore the possibility of doing more, much more than you thought possible. I will make it simple and provide some choices you can make.

In my last article, **Welcome To YOUR Stupendous Retirement Fund**, we had a set of governing portfolio-level equations. They are restated below for convenience (Figure #1) to make parallels between the before and after retirement. The intention is to break these equations into two periods, with one period after retirement: either as a walk-forward, another simulation phase, or simply continuing what the strategy was doing before.

You can always estimate a probable outcome for your retirement fund based on your fund's average expected growth rate and how long it would take to reach your goal using the future value formula: $FV = F_0 \cdot (1 + r)^t$. And this, no matter how you would want to invest. For convenience, make t the number of years before you retire.

You supply the initial capital F_0, the expected growth rate r, and the time required to do the job t. You know how much money you have or can invest in such a project. If you do not have enough money, find ways to increase that initial capital, borrow it, or contribute to your investment fund as if making long-term contributions to your pension plan. You can refer to my articles on ways to build a retirement fund. I have written many over the past three years.

Figure #1: Portfolio Equations

$$F(t) = F_0 \cdot (1+\bar{g})^t = \sum_1^N \left(F_i \cdot (1+\bar{g}_i)^{t_i}\right) \tag{1}$$

$$F(t) = F_0 \cdot \prod_1^N (1+r_i) = F_0 + \sum_1^N (b_i \cdot r_i) \tag{2}$$

$$F(t) = F_0 + \sum_1^N (q_i \cdot \Delta_i p_i) = F_0 + \sum_1^N (\mathbf{H} \cdot \Delta \mathbf{P}) \tag{3}$$

$$F(t) = F_0 + \sum_1^N x_i = F_0 + N \cdot \bar{x} = F_0 \pm X \tag{4}$$

Including The Future In The Equations

The following set of equations presents two phases: one up to retirement time t and the other giving a forward projection once retired. The equations can also serve for any phase segmentation you might find appropriate.

$$F(t) = F_0 \cdot (1+\bar{g}+\bar{\gamma})^{t+\tau} = \sum_1^{N+\aleph} \left(F_i \cdot (1+\bar{g}_i+\bar{\gamma}_i)^{t_i+\tau_i}\right) \tag{5}$$

$$F(t) = F_0 \cdot \prod_1^{N+\aleph} (1+r_i+\gamma_i) = F_0 + \sum_1^{N+\aleph} (b_i \cdot (r_i+\gamma_i)) \tag{6}$$

$$F(t) = F_0 + \sum_1^N (q_i \cdot \Delta_i p_i) + \sum_N^{\aleph} (q_i \cdot \Delta_i p_i) \tag{7}$$

$$F(t) = F_0 + \sum_1^N (\mathbf{H} \cdot \Delta \mathbf{P}) + \sum_N^{\aleph} (\mathbf{H}_{\aleph} \cdot \Delta_{\aleph} \mathbf{P}_{\aleph}) \tag{8}$$

$$F(t) = F_0 + \sum_1^N x_i + \sum_N^{\aleph} y_i = F_0 + N \cdot \bar{x} + (\aleph - N) \cdot \bar{y} = F_0 \pm X \pm Y \tag{9}$$

I added ($\aleph$) more trades to an existing strategy with an average profit or loss of $\bar{y}$ over the added trading interval (τ). The most basic equation is $F(t) = F_0 + \sum_1^N x_i + \sum_N^{\aleph} y_i$, which is the sum of profits and losses over the first N trades plus the sum of profits and losses after the N trades up to $\aleph$.

Notes: $\aleph$ is added after N has been reached, so is γ_i. This is more visible in equation (8), where the payoff matrices are separated from 1 to N, followed by the second matrix with $\aleph$ going from $i = 1$ to $\aleph$. The same separation is also visible in equation (9) with $F(t) = F_0 \pm X \pm Y$.

If your trading strategy has already made a thousand trades before reaching t, we could ask it to continue doing the same over the added trading interval τ. We can restate equation (5) as:

$$F(t) = \left[F_0 \cdot (1 + \bar{g})^t\right] \cdot \left[(1 + \hat{\bar{g}} - \hat{\bar{w}})^\tau\right]$$

with the added period performing at the same expected level as before retirement. The result will depend on if $\hat{\bar{g}} \to \bar{g}$. The equation has two phases, one up to retirement age t and the other after, where we anticipate taking out an average yearly withdrawal rate.

So, explicitly, you are left with what you can do before retirement age t and what you could achieve after where you do not know if you will be able to maintain your expected growth rate $\hat{\bar{g}}$. You already anticipate that the expected withdrawal rate $\hat{\bar{w}}$ will be 5% per year.

The initial capital for the extended retirement period τ is what the fund achieved before retirement, that is: $F(t) = [F_0 \cdot (1 + \bar{g})^t]$. You are not restarting over from scratch; you continue the same processes you had before retiring using the same investment methods.

We should note that if: $\hat{\bar{g}} - \hat{\bar{w}} > 0$, then your retirement fund will grow while in retirement so that your 5% withdrawal will also grow as you age. It is a fundamental advantage you have over fixed annuity payments. If you have a 10% return on your fund after retirement and withdraw 5%, your fund still grows at a 5% rate and you effectively indexed your withdrawals, which will grow at the same 5% rate.

Table #1: Required Rates Of Return With A $50 Million Objective

Objective:	50,000,000		Required Growth Rate to Reach Objective						
Years Before Retirement:		40	35	30	25	20	15	10	5
	Age:	25	30	35	40	45	50	55	60
Initial Capital:	50,000	18.85%	21.82%	25.89%	31.83%	41.25%	58.49%	99.53%	298.11%
	100,000	16.81%	19.43%	23.02%	28.22%	36.44%	51.33%	86.16%	246.57%
	500,000	12.20%	14.06%	16.59%	20.23%	25.89%	35.94%	58.49%	151.19%
	1,000,000	10.27%	11.83%	13.93%	16.94%	21.60%	29.80%	47.88%	118.67%
		SPY		QQQ		BRK-A	TQQ+		

(**Click here to enlarge**)

Table #1 shows what growth rate is required to reach an objective of $50 million before you retire at 65. It depends on the years you have before retiring and your initial capital. The future value equation is re-arranged to extract the required growth rate:

$$\left[\frac{\hat{FV}}{F_0}\right]^{\frac{1}{t}} - 1 = \hat{r}$$

At age 25, it is relatively easy to reach the objective even starting with $50k. It gets more challenging as you get older. Starting your retirement fund at age 60 with the same $50k would require an average growth rate of 298.11% per year over those 5 years. That might be a highly optimistic request, if not utopian. However, reaching that objective becomes more feasible as you give it more time, say 20 to 25 years before retirement. You need to find the tools to generate that growth rate and make it happen.

It is by putting more money on the table that things get easier. A 25-year-old, starting with $100k, could manage the thing with a 16.81% CAGR. That is readily available: buy QQQ and hold for the duration. You could start at 35 and put $500k on the table and achieve about the same results. Again, buying QQQ and holding until 65. You wait until 40 (where $t = 25$) and start with $1 million and again would achieve the same results as the others, reaching your $50 million mark as you retire.

It is when you require more than a 50% CAGR that things get tough. That CAGR is not readily available. It might involve that terrible word: work. It is estimated that 75% of money managers do not exceed market averages, such as SPY with its 10% long-term CAGR. To make more than professionals, you will need to do things differently. If you copy them, you are bound to get about the same results. That can be achieved or close to it starting with $1 million and starting at age 25.

The less time you give your investment strategy to reach its goal, the higher your CAGR will have to be. Lower your objectives and scale down if you cannot muster that CAGR level. It is like anything else: you need to be reasonable and do what you think you can; otherwise, the market, with no effort at all, will show you how ”unreasonable” you were.

Table #2: Required Rates Of Return With A $100 Million Objective

Objective:	100,000,000	Required Growth Rate to Reach Objective							
Years Before Retirement:		40	35	30	25	20	15	10	5
	Age:	25	30	35	40	45	50	55	60
Initial Capital:	50,000	20.93%	24.26%	28.84%	35.53%	46.24%	65.98%	113.85%	357.31%
	100,000	18.85%	21.82%	25.89%	31.83%	41.25%	58.49%	99.53%	298.11%
	500,000	14.16%	16.34%	19.32%	23.61%	30.33%	42.36%	69.86%	188.54%
	1,000,000	12.20%	14.06%	16.59%	20.23%	25.89%	35.94%	58.49%	151.19%
		SPY	QQQ		BRK-A		TQQQ+		

(**Click here to enlarge**)

Table #2 has your retirement fund's objective set at $100 million. And again, we have the required growth rate to reach that goal. For the 25-year-old starting with $100k, to double his or her retirement fund, it would require an added 2.04% to the CAGR in Table #1.

Going from 16.81% to 18.85% is sufficient to gain that added $\$50$ million dollars.

Therefore, the added 2.04% in alpha points should also be part of your guest. It is only a 12% increase to the average CAGR from Table #1.

For the 40-year-old in Table #1 with a starting capital of $\$500$k, he or she would need a 20.23% CAGR to reach the $\$50$ million objective. Adding some 3.38% alpha points would raise the outcome to $\$100$ million. Again, it represents a minimal effort when spread over the years and is reachable by many trading strategies. For example, Mr. Buffett's 50-year CAGR is near that level.

You will need to select which type of long-term investments might provide you with the desired CAGR.

The After Retirement Phase

In the set of equations above, we have a trade numbering sequence from 1 to N to $\aleph$. For example, you have 1,000 trades (N) to which you add a hundred more ($N + \aleph$) with $\aleph$ going from 1 to 100. Those unknown 100 trades will occur during the added trading interval (τ) of undetermined duration. However, those added 100 trades should appear at about the same rate as the first 1,000 should you need to make an estimate on the time it might take. The average rate of return per trade should be close to the average of the first 1,000 trades.

Your program does not usually change its nature going forward. The more the strategy makes trades, the more everything will continue to approach or follow the acquired long-term averages. Your trading strategy made about 100 trades a year for the last ten years; it should also get close to about 100 trades per year for the next ten years. It might be fuzzy, undetermined, and still a random variable, but it should get close to an expected and simple extrapolation.

It is like what was shown in the article: **Welcome To YOUR Stupendous Retirement Fund**, where I added nine weeks of walk-forward to the strategy. The projection was set at the same rate as the previous simulation (an average of 1.02% per trade). This projection came relatively close to the outcome of the new simulation with its added 9 weeks.

The added ($\bar{\gamma}$) in equations (5) and (6) could be applied not only to the added interval but also from the start of the strategy. It would be visible by improving the overall strategy, not just over the extended period τ.

You can always find improvements to a long-term trading strategy by looking backward. The strategy itself can provide useful long-term averages.

What matters is how your trading strategy will perform going forward when facing almost unpredictable market conditions that it might have never seen before.

How did strategies designed before 2020 behave during the COVID-19 pandemic? No one saw that one coming. Was your trading strategy prepared for such a ”black swan” event?

With your trading strategy having more than just a few years of history, you should have a picture of its averages. Whatever your trading strategy does over a few months is unimportant. It could be subject to so much randomness and unforeseeable events that the conclusions you might obtain could be at most coincidental.

You need to deal with long-term averages, generalities, and things that happen often. In essence, it is not a search for anomalies or outliers that might or might not happen in the future that you need to focus on. It is in the generalities you can identify and exploit, meaning you can trade on.

Trading on the short-term, you should seek price volatility. What an opportunity! The market over the short term has a lot of volatility, as shown in the previous articles. We need a lot of small price differentials ($\sum_1^{N+\aleph} \Delta x_i > 0$) to make huge profits.

Your trading strategy, as it unfolds, provides you with information about its general behavior under diverse market conditions, none of which is under its control, but where, on average, it has to make a profit no matter what is thrown at it.

For example, the last article’s 9-week forward projection was based on the average weekly return on the 744 weeks of return data history. That 744-week average was reached in the first 50 weeks of trading and stabilized at the level with randomly distributed oscillations around its mean. Your projection could have been made years before the added nine weeks.

The **One Percent Per Week** strategy was last improved by a profit target bump from 7% to 8% if part of the move was already in progress. It impacted the entire strategy, even the added nine weeks. As such, that added 1% to the profit target once averaged over the strategy would represent a small fraction of 1% but would still impact the overall strategy since ($\bar{\gamma}$) over the entire period was greater than zero and compounding (see equations (5) and (6)).

The Better Strategy S^*

If you have a strategy S^* designed to outperform a strategy S and both are structured as $F(t) = F_0 \cdot (1 + \bar{g}_{S^*})^t$ and $F(t) = F_0 \cdot (1 + \bar{g}_S)^t$, you will need $\bar{g}_{S^*} > \bar{g}_S$ to outperform strategy S. But, already $\bar{g}_S$ has some alpha since: $\bar{g} = \bar{r}_m + \bar{\alpha}$. It would mean having $\bar{g}_{S^*} > \bar{g}_S$, and you would need an alpha that is greater than the one in $\bar{g}_S$ since, again both strategies can capture $\bar{r}_m$ over the same time interval.

The outperformance is not provided by the market but by your actions, trading, and gaming procedures. You are the one responsible for bringing in that alpha.

The alpha you added to strategy S ($\bar{\alpha}_S$) will have to increase to ($\bar{\alpha}_{S^*}$). Otherwise, your improvements would decrease and not increase the overall performance, whether over past or future price series. Both S and S^* will face the general market conditions. Both include $\bar{r}_m$, the long-term market average. If you want to outperform SPY, for instance, you have to add some alpha, such as designing S or S^*, or the S^{**} of S^*, a higher performing strategy than your S^*. We could order those strategies based on performance alone: $\cdots > S^{**} > S^* > S > SPY > S_{<\,spy}$.

There is an infinity of S strategies that can outperform SPY and an infinity of strategies S^* that can outperform strategy S. The same goes for S^{**}.

Because of this infinity of candidates, you are unable to know more than $\cdots > S^{**} > S^* > S > SPY > \cdots$. And whichever strategy you adopt, note that there is still a multitude of others that can do better or worse, with some doing much, much better.

If you want to automate, you have to pick one or a few out of the millions and millions of possible choices before starting your trading program.

You do not design your trading strategies to agree with past data; you need to create them to profit in the future, where anything could happen.

You only have backtesting to determine if strategy S is better than SPY or S^* is better than S. There is a need to backtest over ten or more years to get those long-term averages, and your strategy needs to have hundreds of trades to give those averages some reliability.

Buy & Hold SPY is one trade, and all it can give you is the expected historical SPY rate of return, more or less. Picking a single high-performance stock part with a higher than SPY rate of return will outperform SPY. But then, you will have to choose that stock before you know how far it could go.

The Implementation Delay

Your strategy should go live after the initial testing for validity and performance. Consequently, you should ensure that what your strategy did over past market data is trustworthy enough and that, going live, the strategy will continue to do what it was programmed to do.

Just as we simulate launching a rocket in space before going live or testing a plane before having people on board, it's reasonable to plan your investment strategy for the long term. The approach could reassure you that your trading strategy might survive for years.

Feasibility testing through backtesting is crucial to determine if your trading strategy can outperform market averages. This process will also activate only viable and potentially successful strategies.

You have a multitude of trading strategies to choose from. You cannot know which is the best since there is always one strategy S^* that is better. You have to pick one (or as many as you can) and live with it until you find a better one.

Your immediate constraint will be your initial capital (F_0) and not the lack of trading strategies.

Equation (8) looks relatively simple but has more to say. With the payoff matrix $\sum_1^N(\mathbf{H} \cdot \Delta \mathbf{P})$ as the origin of your profits, you have to consider: (1) the number of trades, the composition of the holding matrix $\mathbf{H}$ and the price difference between entry and exit for all the executed trades. Stock selection and size matter, and the path of each stock over the entire trading interval also matter. The holding matrix $\mathbf{H}$ is the outcome of the trading logic used since it registers all the trading activity (opened and closed trades, even partial trades): $\mathbf{H} = \mathbf{B} - \mathbf{S}$; the **B**uy matrix minus the **S**ell matrix.

It is where the size of the problem can get complicated. It is not finding the best trading procedures for a stock over a specified trading interval; it is finding an average solution to the hundreds of trades over hundreds of stocks that could be part of this payoff matrix over the years, not only as a backtest but with the prospect that that strategy is intended to go live at some point and continue trading for years and years into an unknown future.

Taking 100 stocks from the S&P500 index has more than 10^{400} combinations. You will be picking one of those. You would compare it to what? The more than 10^{400} that remains?

You better do simulations on past data because you cannot waste your time waiting for a long walk forward. Such a thing can be costly.

For example, paper trading for three years before engaging your strategy could have the following long-term effect: $F(t) = F_0 \cdot [(1 + 0.20)^{23} - (1 + 0.20)^{20}] = 27.91 \cdot F_0$. If you started with one million, that would be an opportunity cost of $\$$27.9 million just for the walk forward. You could delay three years for other reasons, like not having the required initial capital; the opportunity cost would be the same.

We have to be consistent with what we plan to do; waiting, even if it does not cost anything immediately, does not mean it costs nothing. The opportunity cost can be considerable. If you reached the 35% CAGR, the opportunity cost could rise to $\$590$ million over the same period. Choosing what you can and cannot do is a matter of choice.

If you need more backtests on your trading procedures, do them. Make them reasonable and executable.

Gain confidence in your procedures and make them apply generally, in the sense that they lead to long-term averages and procedures that could happen often.

One of the things expressed in the article series **One Percent Per Week** is that shortening the trade interval can help increase the overall rate of return. The objective of the *one percent per week* program average gives: $(1+0.01)^{52} = 0.67769$.

Based on the last simulation, the strategy had 51.26% winning and 48.74% losing trades. It managed to have an average 1.03% return per trade to generate a 57.58% CAGR for the period (14.44 years). The strategy is not always in the market; it has a 51.06% exposure rate, which can explain the ten percentage point difference from the expected 67%. The difference between the per-trade and per-week calculations can explain this.

Nonetheless, those are remarkable results for a strategy with only three trading rules. It plays on the average price gyrations in QQQ, its non-leverage counterpart. If we expected 15% to 18% short-term volatility in QQQ, we should consider that TQQQ's volatility should be about 3x higher. It is even with the return degradation built into the TQQQ ETF design.

We are not asking for anything unusual. There is no trick, no gimmick, no secret sauce, just observing what the price series should do, and that is track and mimic QQQ's every move and leveraging it 3x.

In its relatively short history (14.44 years), TQQQ has had 7 stock splits (6 times 2:1 and once 3:1).

Furthermore, QQQ is a subset of SPY, the top 100 of SPY. TQQQ is leveraging the top 100 highest-valued stocks on NASDAQ three times over. No wonder it can exceed SPY's long-term result. It does so by construction.

The average of the top 100 highest-valued stocks has, by definition, to exceed the average of the top 500. So, it is not surprising we can state that we will have TQQQ $>$ QQQ $>$ SPY's long-term return. And that has been demonstrated in the article series: **One Percent Per Week**.

We also have equation (6) that can be re-expressed as follows:

$$F(t) = \left[F_0 \cdot \prod_1^N (1 + r_i + \gamma_i) \right] \cdot \prod_1^{\aleph} (1 + \hat{\bar{r}} + \hat{\bar{\gamma}})$$

where the added $\aleph$ trades behave the same as the previous N trades at their expected average performance levels. You could segment the equation above into as many parts as you wish as if your strategy were changing course. For example, N trades before retirement, and $\aleph$ trades after behaving in the same fashion as the previous time interval.

You are not designing a trading strategy for what happened, but you can use what happened to determine what you will do going forward. Your trading strategy needs to be planned in advance, and the only way to find out if it works is to test it over past market data. And even there, you will not have a guarantee that it will also work in the future. Nonetheless, you cannot afford to go blind or on a whim saying that it will all work out. The market does not care about your intentions or wishes.

As a renowned economist once said, the market can stay irrational longer than you can stay solvent.

Related Papers and Articles:

Welcome To YOUR Stupendous Retirement Fund

The One Percent a Week Stock Trading Program: **Part VII**, and **Part VIII**

The One Percent a Week Stock Trading Program: **Part V**, and **Part VI**

The One Percent a Week Stock Trading Program: **Part III**, and **Part IV**

The One Percent a Week Stock Trading Program: **Part I**, and **Part II**

The Long-Term Stock Trading Problem: **Part I**, and **Part II**

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The Age Of The Individual Investor

Use QQQ - Make the Money and Keep IT

Take the Money and Keep it – II