



## Why it's Necessary to Save

I have given some thought to naming this piece "Why life is so unfair." The reason will emerge as we look deeper into the matter. In one important sense however, it would be grossly inaccurate to tie these remarks to "Life." I am not going to talk about life; I am going to talk about money and saving, and especially about living off savings. If that is all there was to life, the poor would simply go away and die, but in reality many of them are having as much fun and doing as much good as are the rich, or even more so. Be that as it may, it is necessary to save.

This essay is about persons and institutions that live off the income and gains produced by investments. Historically investors of that type – so-called "passive investors" – have been called "rentiers." Capitalists of the other type – those whose income includes a significant amount of what amounts to salary for work performed – are "entrepreneurs." In America today, the lion's share of the savings that provide the entire cash flow to rentiers belong to non-profit institutions. Nonetheless, I will follow tradition by personalizing the rentiers. The institutions and the persons differ in a couple of important respects, both of which make the people significantly more vulnerable. One difference is that persons have limited planning horizons, but colleges and hospitals and the like expect to be in business for many generations. An even greater difference is that the capital of an institution is added to over time as grateful donors contribute to the places they favor. The individual rentier, by contrast, is on his own and may in fact be expected to contribute to some worthy institutions. By focusing on living rentiers, therefore, I will attribute to them limited lifetime horizons and no other source of income.

The person has some pool of capital – savings – which he expects in an average year to deliver some known rate of return. So for instance if his wealth is \$500,000 and his expected rate of return is 20%, and if the coming year is a perfectly average year, he will earn \$100,000 to live on. If however he plans to spend the entire \$100,000 or anything close to it, he is planning – whether or not he realizes it – to go bankrupt. He has to expect that in a few years his capital will be gone. This seems rather a mystery: how can it be that if he only spends as much as he expects to earn, with very high likelihood he will soon be broke?

The explanation is that this rentier, like all of us, has expenses. They are to some degree controllable. It is possible to plan to gradually tighten his belt; to plan permanent

adjustments to outlays to deal with lessened income. But there is a limit to this. His capital is there to provide for his living expenses, after all. The expenses in some sense come first. They are what they are, and it is his hope that his income will cover them. If he could calculate the other way around – to settle up his income first and then to spend accordingly – it would not really be correct to say that his income provides for his needs. He couldn't have any "needs." But as we accumulate capital, and then after we have started to live on it, we do start with what we see as our needs.

We have taken our proverbial sharp pencils to this problem, and in particular to the question of what happens as projected saving – the difference between the projected earnings on capital and projected outlays – shrinks or expands. The calculations are however only as good as the assumptions that they rest on, so before I characterize the results I should explain them.

### The Typical Rentier.

The rentier in our study is someone who has some set dollar amount of capital at the start, and who has an investing horizon of twenty-five years. We plan to follow his fortunes for that length of time or until they are overwhelmed by his misfortunes, whichever comes first. There is of course no arithmetical reason to stop at twenty-five years. The computer would happily continue for a century, but as it turns out, not much happens after about twenty-five years. By that time the rentier is either broke or rich.

These assumptions are not very problematical. I need however to pay a little more attention to how we describe his spending behavior. We assume that he perceives certain needs that amount to the minimum that he can spend in a year. Even if his investments are disappointing, he will not tighten his belt any further if he can avoid it. It would be possible for him to spend less. Indeed, if he loses all his capital his spending is going to fall to zero, but this minimum planned spending level is built into his saving and investing plans. The question we are addressing is, after all, not whether he will actually save. It has to do instead with plans and intentions: does he plan to save. So in even the worst years, we will assume that he spends his minimum. On the other hand, if his investment program turns out to be much more successful than he anticipated it would, he will certainly not be limited to covering his needs. If he should become rich, his "needs" will expand accordingly.

That is the idea. We have implemented it in a simple, concrete way. We assume that at the start of the investment plan, the rentier fixes a percentage,  $S$ , which is the ratio of his needs to his initial capital. If, for instance, he starts with \$1,000,000, and feels that he wants to spend at least \$110,000 each year, the ratio  $S$  would equal 11% ( $= \$110,000 / \$1,000,000$ ). As long as he is able, he will spend at least the much each year. If he starts a given year with more capital however, he will still spend the same fraction,  $S$ , of whatever he has started with. In summary, each year his outlays are equal to the **larger** of two amounts: \$110,000, and  $S$  times his capital at the start of that year.

This rule characterizes his planned outlays completely. How do we characterize his planned income? We make the most conventional assumption, which is that he has a fixed expected rate of return,  $E$ , which is the expected profit for a year as a percentage of his initial capital, and that the actual results each year follow a random walk centered on that mean value. If  $E$  was a certainty, all would be well. By the same token, if wishes were crowns we would all be kings. There is a third essential determinant to be considered: the variability of actual year-to-year gains and losses on investments. We will assume that gains and losses are entirely unpredictable and that they follow a normal Gaussian distribution. These are the assumptions that are built into the familiar Random Walk model of the stock market, and they amount to assuming that each year “the world” draws a number from a hat which will be the rate of gain or loss for that year. From year to year there is no memory – the hat is always the same no matter what has happened in years past. I will use the letter  $V$  to designate the standard deviation of the Gaussian distribution of gains and losses.

It is entirely possible that this particular rentier – perhaps you the reader – has some unique skill or insight into investing. Thus while the sequence of outcomes from year to year is entirely random, it is possible that this rentier achieves an average – the expected rate of return – higher than the common run of rentiers. Over the last several decades, the average annual rate of return on American stocks has run around 8%. If the rentier was merely average, his expected rate of return would be 8%. Actually, this 8% is before taxes, so the expected rate of after tax return – which is the relevant figure – is somewhat below 8%. Professional investors who take their work seriously seem to have a somewhat higher expected rate of return. In the interests of giving this rentier every possible chance, I will assume that his pre-tax expected rate of return is 20%, and that his after-tax expected return is 16%.<sup>1</sup> Anyone who suffers from a modest initial fund of capital and who can not generate an expected return of 20% or higher should Definitely keep his day job.

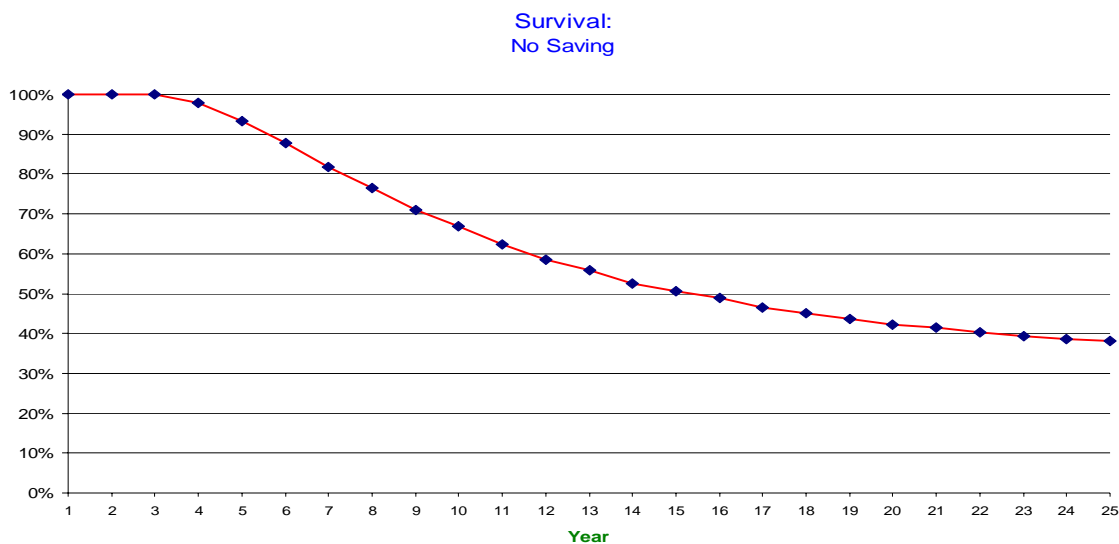
Now we have all the givens that we need to draw out the history of the typical person. The case of no expected savings is a good place to start. As we have described the typical rentier, he starts with some savings – I have assumed that he starts with \$500,000 – and plans to live on that capital for twenty-five years. To say that he does not expect to save – i.e. that he expects the profits from his investments to cover his expenses on average – is to say that he plans to spend 16% of his capital each year. The first year he has half a million dollars and plans to spend \$80,000. If his investments perform well, he will let his outlays creep higher, but in any case he is spend at least \$80,000 each year. Since these are already after-tax dollars, that seems like a rather nice standard of living as long as he does not fall in love with boats. I should caution the reader however that a rate of return in the 20% vicinity is really extremely good. It would place him among the

---

<sup>1</sup> This works our to a tax rate of 20% on annual returns. The subject of taxes is of course mind-numbingly complicated, and I have simply waved it away with then assumption. The assumed tax rate is however quite reasonable. In order to achieve a 20% expected return pre-tax, it is necessary to make changes rather frequently in the portfolio. As a result, most gains will be short term gains, treated as ordinary income, rather than long term holdings. In addition, the rentier will from time to time have to dip into his capital to cover his living expenses, and this also is costly from a taxation perspective.

more successful professional investors. The question then becomes: “If he is that astute an investor, can he live on the fruits of \$500,000 of capital?”

I could rephrase this question. “How long can he live on the fruits of his investment?” If he has only average luck, there is a fifty per cent chance that he will be bankrupt within fifteen years. The accompanying chart shows the so-called “Survivor Curve” of rentiers similar to the individual we have taken as a test case. The specific numbers in the chart are based on a standard deviation of 30%, but the numbers are surprisingly insensitive to the exact standard deviation as long as it is fairly high. It goes without saying that even the shrewdest investors – the ones who have even a chance of a 20% expected rate of return – inevitably have a very high variation from year to year.<sup>2</sup> The survivor chart follows:



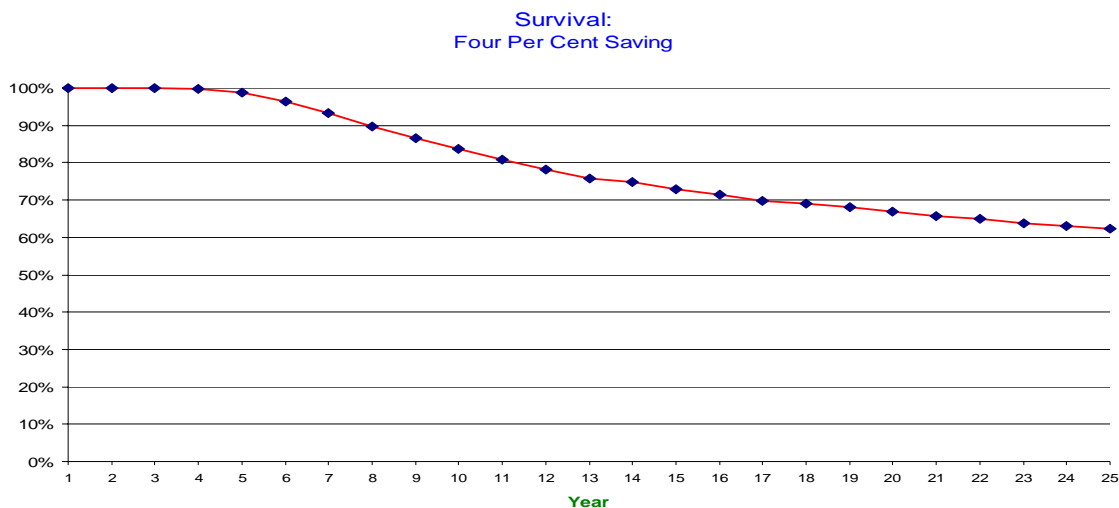
*Assumptions: Expected after-tax rate of return and rate of withdrawals both equal to 16% per year. 30% year-to-year standard deviation of investment returns. Simulations based on 1000 cases.*

The survivor curve crosses the crucial 50% line at about fifteen years. Less than 40% survive twenty-five years. On the other end, nearly everyone survives the first few years because it takes a few years of even very bad luck – plus withdrawals to cover expenses – to lose the entire \$500,000 that he started with. By eight years however the survivor curve is falling pretty rapidly. About 8% of rentiers will go bust between eight and ten years alone. There are other aspects of this chart that I will return to in a moment,

<sup>2</sup> The peculiar structure of the tax code also adds a lot to the variation of the results that an investor can achieve. Just as the relevant expected rate of return for our purposes is the after-tax rate, so also is the relevant standard deviation the standard deviation of after-tax returns. The fact that the investor is limited to a deduction of \$3000 for realized losses in any one year means that in years when he realizes gains he settles up with the I.R.S. immediately, at high cost. But when he realizes losses the I.R.S. simply refuses to settle up with him. This lopsided system effectively raises the average tax rate and increases – greatly increases – the variation of after-tax returns.

but for the moment we want to focus on the main point, which is how saving adds to the investor's life expectancy.

The other simulation we will consider represents a somewhat thriftier rentier. We assume that his investing skills are equal to those of the aggressive spender in the preceding chart. His after-tax expected rate of return is also 16%, with a year-to-year standard deviation of 30%. The only difference in this case is that rather than withdrawing 16% every year to live on, this rentier only withdraws 12%. His saving rate – in the sense of his expected gap between returns and withdrawals to spend – is four per cent. The survivor curve for this rentier follows:



*Assumptions: Expected after-tax rate of return equals 16%; rate of withdrawals equals 12% per year. 30% year-to-year standard deviation of investment returns Simulations based on 1000 cases..*

More than seventy per cent of these rentiers survive fifteen year and more than sixty per cent survive twenty-five years. By leaving some money on the table each year, this individual has nearly doubled his chances of successfully providing for his needs over a period of twenty-five years. The bad news is that there is still a significant chance that he will come up short. In fact, all the money that he saves – all the things that he could have enjoyed along the way but did not – continues to be invested at risk. This should not obscure the essential fact however that the true risk that both rentiers experience is caused by the presence of a minimum rate of spending in good years and in bad ones. In good years they both finish the year with more capital than they started, because their investment returns more than cover their expenses. But in bad years the investing losses are compounded by the withdrawals.

Risk, correctly understood, is not just a matter of not knowing what the future will bring, or of not knowing how a given decision will turn out. That kind of uncertainty is what Frank Knight called "Uncertainty." Risk has only one, much more pointed meaning. Risk is the risk of failure; it is the risk that one will have to stop doing what he hoped and planned to do.

It is not the unpredictability of investments that constitutes risk. It is the collision between the unpredictability of investment gains and the predictability of spending needs that causes risk.

The simulations on which the charts are based have more to tell, by shedding light on other aspects of an investing program is likely to evolve over time.

### What Does This Say about Track Records?

The simulations which are summarized in the two charts above have something to say about an investor's track record. It is customary in the investment world to rely on a track record of three or four years. Unfortunately, the survivor curves do not endorse such short histories. In both charts it takes about eight years to start to really separate the survivors from the casualties.

Here again, the test of success or failure is not simply whether the program achieves a positive rate of return. The money that is being invested is there for a reason, and the entity to which it belongs has some required minimum draw; some minimum acceptable rate of return. Under plausible assumptions about expected returns and return variation, it take about eight years to find out whether the program is delivering or not.

### And a Word about Unfairness.

At the start of this note, I threatened to title it "Why life is so unfair," but I do not intend that one take this question too literally. What seems unfair about saving is that over time the outcomes for individual rentiers diverge to an astonishing degree. The rich do indeed get richer than most of us might imagine, while the poor go bust. The simulations that I reported on above are based on a simple idea: using the computer to play out the histories of 1000 identical rentiers. They are indeed identical at the beginning of the exercise both in terms of how much capital they have and in terms of their investment prowess. We have credited them with a very high degree of prowess: their expected rate of return is a very impressive 20% pre-tax, but we have assumed that how they fare around that expectation is purely a matter of chance. Thus the actual investment outcome in any year is simply a random drawing from a distribution that has that mean. Who goes bust and who prospers is therefore entirely a matter of good or bad luck.

Accordingly, life has been unfair to them to the degree that their outcomes are different. To put this into quantitative perspective, consider the 1000 rentiers who plan to spend all their expected gains: the ones who plan to spend at least 16% of their savings each year. As we know, most of them do not last the full twenty-five years. Less than 40% – about 38% – make it. Right now however we want to take a harder look at how the survivors fare.

Based on a sample of 1000 histories, it turns out that the average survivor has accumulated about \$2 million of savings after twenty-five years! Put differently, if one were Guaranteed at the start that he would be among the survivors, he should expect over the course of time to multiply his initial capital four times, even though each year he spends at least as much as he expects to gain on his investments.

The same result can be reframed in terms that bring out even more clearly how well the survivors do. The ten-times growth of savings starts from the perspective of the whole starting class of 1000 rentiers. After the twenty-five year history has passed however, only the survivors are still visible. The 62% who failed have effectively disappeared from the sample and only the 38% who are still living on their investments are left to respond to follow-up surveys. The feedback from such a survey therefore necessarily measures success conditional on being in the survivor group. Put differently, we could ask how prosperous and successful the survivors appear to be after twenty-five years.

The average survivor, after twenty-five years, has accumulated wealth of about \$5.25 million, which is more than ten times what he started with. In the first year of his career as a rentier, he lived on \$80 thousand, which was 16% of his initial capital. Twenty-five years later his capital has grown by about ten times, and so his living expenses have also expanded by about ten times. His new cost of living is closer to \$800 thousand than to \$80 thousand. He has moved from the garden apartment to the penthouse. If he has survived it is not because he is thriftier than any of the other 999 rentiers in our hypothetical sample. Quite the contrary, those who did not make it have had much less income to spend. It is not – to adopt a Dickensian analogy – the Bob Crachetts of the world who are living high.

It is not my intention to convict the world of unfairness, or at least of injustice. Every one of the 1000 rentiers who started in our sample had the same prospects as the others. Not all were going to succeed because there is just not that much “success” to go around. We imputed to each of these investors a 20% expected rate of return – a daring but not impossible assumption – but we always knew that the world does not offer anyone a guarantee of that kind of rate of return. There are going to be winners and losers.

*It is nonetheless rather shocking to see in fact how much they diverge: how numerous and how poor are the laggards and how rich are the survivors after twenty-five years.*

*4052 Niles Rd.  
Saint Joseph, Michigan, 49085  
Tel: 269-408-1511  
E-mail: [jgibbons@logisticresearch.com](mailto:jgibbons@logisticresearch.com)  
Web Site: [www.logisticresearch.com](http://www.logisticresearch.com)*