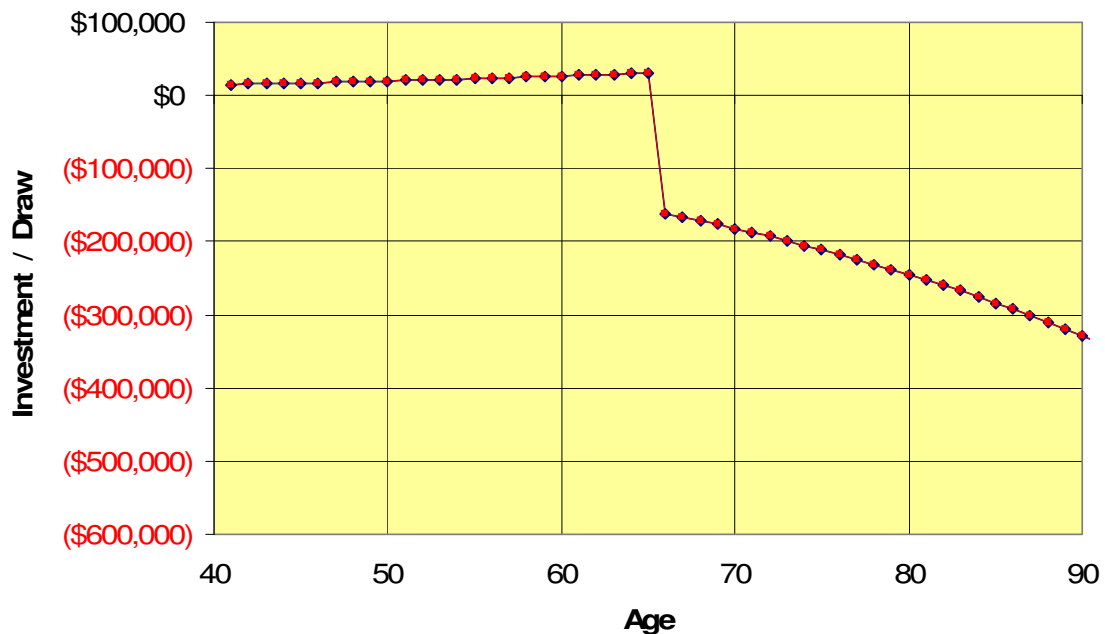


Many investors have become familiar with the concept of the ‘equity glide path,’ which is the name given to the gradual shift in portfolio allocation from equities to fixed income with an investor’s age. I have been thinking about a similar concept for the life cycle of savings, investment, and income draws from a portfolio in retirement—and I have taken to thinking about this trajectory as the *income glide path*. The traditional world view of retirement assumes that an investor works and invests over his or her career, increasing the savings rate steadily with inflation. The portfolio grows due periodic additions and due to price gains and dividends from the assets in which it is invested. At retirement, the flow reverses, and the investor now draws from the portfolio—possibly increasing this draw with inflation. The standard assumptions about how much you can draw in retirement are typically based on this form of savings/income trajectory.

In the real world, of course, things are more complex. Investor’s often have lump-sum purchases or sales that have a marked impact on their portfolios. Aside from these one-off events, there is a very interesting feature of the savings/spending cycle that is changing—how people approach retirement and career transitions. When you calculate the adequacy of your portfolio to sustain you in retirement, it can be important to account for the details of your savings and income over time. I know more than one young doctor who is saving and investing aggressively in order to have the ability to change careers at around age 50. I have also noted that a lot of Baby Boomers are either working part-time in their jobs or are transitioning to life-style businesses. Portfolio planning for these people is not the simple case of working until age 65 and then retiring and living entirely off of your investments.

Consider a 40-year old who is planning to retire at age 65—let’s call him Joe. He is investing \$15,000 per this year, and will index that savings rate upwards with inflation (set to 3% per year). He plans to draw \$75K per year in current dollars at retirement, and index that draw upwards with inflation. His current savings / spending plan can be visualized with the chart below:



Baseline income glide path

This is the *income glide path*. What is really notable when you look at it this way is that Joe goes from being a net saver of \$15,000 per year (in 2007 dollars) to being a net spender of \$75,000 per year (in 2007 dollars). There are certainly plenty of people for whom the income glide path will look like this, but there is also a growing trend towards different savings / spending profiles. Is this profile really how you are going to manage your savings / income draw?

I have been thinking about some alternate views of the income glide path that are increasingly common. The simplest modification of this picture is to assume that we don't want or need such an abrupt shift from being net savers to net spenders. There are plenty of Baby Boomers who are working at a reduced level rather than retiring. Many experts feel that the inclusion of some level of paid work is a natural transition from working full time to complete retirement. Consider Joe's scenario with a gentler glide path—by which I mean one with a more gradual transition from saving to consuming. For many investors, it is more realistic to plan on a smoother transition from investor to consumer. The assumption is that Joe is doing some kind of work for pay so that he does not need to draw as much from his portfolio.

For the purposes of this example, let's assume that Joe has \$250K in his portfolio and that it is invested in the following portfolio of ETF's:

Fund Name	Percentage of Funds
IVV	20%
EFA	10%
EEM	15%
IGE	5%
IDU	5%
IXC	5%
ICF	5%
TIP	35%

Model ETF portfolio

Joe's portfolio is invested in a series of equity index ETF's, with a bond ETF to limit volatility. We have 20% in large-cap domestic stocks (IVV), 10% in large cap foreign stocks (EFA) and 15% in emerging markets (EEM). There is a substantial investment in inflation-protected bonds (TIP). Smaller investments include utilities (IDU), real estate via REIT's (ICF), and investments in natural resources / energy (IXC and IGE). This portfolio has done well in recent years due to the positions in energy, but our projections are that this portfolio will generate 9.4% per year going forward, considerably less than the 14.5% in average annual return that we have seen over the past three years.

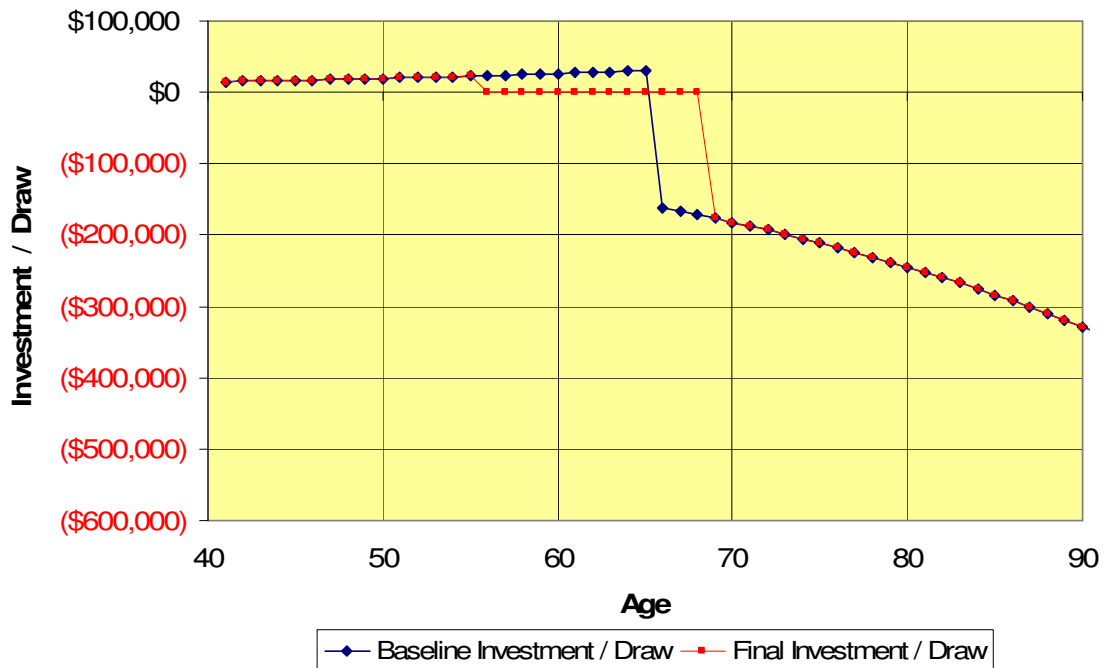
We want to get a sense of how realistic Joe's goals are. To do this, we must account for the portfolio risk and return, along with Joe's income glide path. The results are calculated using Quantext Portfolio Planner (details provided in a later paragraph). With the baseline income glide path, Joe is in good shape to retire at 65—he has only a 20% chance of drawing down his portfolio by age 94:

Probability of Running Out of Money	Age
10%	83
15%	87
20%	94
25%	99

Probabilities of drawing down portfolio by a certain age for baseline income draw

These results show Joe's portfolio survival rates under the standard model of working and saving until retirement, at which point he draws full (inflation-indexed) income from his portfolio---the baseline case.

Consider our alternative situation in which Joe might want to down-shift his career, but work later in life. He will be making less money in his transitional career, but he is making this tradeoff because of his specific goals---he just has other things that he wants to accomplish at this stage in his life. With his lower-paying job, Joe's plan is simply to live on what he makes and not to save and invest. His existing portfolio will continue to grow, and he will not draw from this portfolio until he is actually ready to fully retire. Joe plans to enter his new career at age 56 and wants to get a handle on how long he will need to work at this lower level of pay until he can retire. This calculation is not trivial. If his investment portfolio does not do well, he will end up with less wealth as the base for future income when he is ready to retire. Joe wants to maintain his risk profile so that he has only a 20% chance of drawing down his portfolio by age 94, as in the base case. To accomplish this, Joe ends up with the income glide path below:



Baseline income glide path vs. modified (Final) income glide path

This chart shows that Joe stops investing in his portfolio after age 55 and draws no income from the portfolio until he is 74, at which point he starts to draw the \$75,000 per year (in 2007 dollars)---which is a great deal more in inflated dollars, as shown above. Joe has ten years in which he does not save what he would in his baseline case—and the payback for these ten years is that he must keep working another three years beyond his original retirement date. His probabilities of drawing down his portfolio under this scenario are shown below.

Probability of Running Out of Money	Age
10%	85
15%	90
20%	94
25%	101

Probabilities of drawing down portfolio by a certain age for modified income draw

Joe still has a 20% chance of running out of funds by age 94, as in his baseline plan. There are some differences between these two sets of probabilities, with the modified income glide path looking as good or better at all percentiles than the baseline case.

If we scale up the allocation to large cap domestic stocks (IVV) to 35% by reducing the bond exposure (TIP) to 20%, Joe's probabilities improve so that he only has a 20% chance of running out of funds by age 97 for Joe's modified income glide path. In the baseline case, this allocation does not change the 20% probability for Joe—it remains at age 94. This result is probably due to the increased temporal smoothing in total returns in the modified case—Joe leaves his money invested for three extra years and this offsets the reduced savings late in his career. This type of result has very important (if not surprising) implications: **your asset allocation choices will be improved if you include the specifics of your plans for saving and withdrawals.**

To really understand the implications of this kind of analysis, you have to understand where it comes from. Calculations of safe withdrawal rates from a portfolio yield results such as those shown in the probability tables above. There are several key factors that determine how much you can draw and for what period of time if you want to manage the risk of totally exhausting your funds. Obviously savings rates and initial portfolio size are very important drivers. The portfolio volatility and return are also critically important drivers of these probabilities. If you invest too conservatively (too many bonds, too few equities), you will not get the aggregate growth that you need to sustain your future income. If you invest too aggressively, you can end up needing to draw income from a portfolio during a down period and disproportionately draw down your portfolio. Investing too conservatively exposes you to excessive longevity risk (outliving your money), whereas investing too aggressively exposes you to excessive market risk. The standard way to account for these effects is to use Monte Carlo simulation. There are some simple estimates of safe withdrawal rates that you can look up in tables (see the work of Moshe Milosevic, for example). To solve this problem with a portfolio of real assets and with varying income draws, there is no alternative to Monte Carlo. The probabilities shown in our examples for Joe were generated using *Quantext Portfolio*

Planner (QPP), a Monte Carlo portfolio management tool that simulates risk and return for portfolios and calculates the probable portfolio survival rates once you specify your savings and income draws. The interactions between the portfolio allocation, the initial portfolio size, and the income glide path are complex. The best portfolio allocation for an investor will be a function of his or her income glide path—there is not a one-size-fits-all solution. While earlier versions of our software allowed only income glide paths such as those shown in the baseline case, it has become apparent that investors' personalized income / spending trajectories vary enough that it is important to provide this kind of flexibility.

As people live longer, it is increasingly apparent how important it is to balance *longevity risk* and *market risk*. The reality is that more people will not transition directly from working full time to living off of their retirement portfolios. Either by choice or necessity, many (if not most) Americans will work part time for some period in between full-time employment and full-time retirement. For many people, this is not a burden but a choice—an opportunity to work in some field that they have always wanted to explore, but which had too high an opportunity cost earlier in life. There is, of course, also the reality that many older people will simply not be able to work and save on a continuous basis due to health concerns or workplace dislocations. Accounting for this sort of transition in investment planning and asset allocation can provide valuable insight.

There are, of course, many variations on the income glide path. I know quite a few people who work in one career, building seniority and income, who later want or need to transition careers. Early in the transition process, earnings (and thus savings) tend to be lower, but the saving trajectory ramps up with experience in the new field. While sociologists, economists and a range of others have been discussing this sort of career transition for quite some time—and we are seeing this manifested in society--the implications for financial planning and asset allocation (specifically) have not gotten a great deal of attention.

Quantext Portfolio Planner is a Monte Carlo portfolio management tool. Extensive case studies, as well as access to a free extended trial, are available at <http://www.quantext.com/gpage3.html>