Life Cycle Funds: The Good, the Bad, and the Possible

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Introduction

This article discusses investment approaches for defined contribution investing. We first discuss how life cycle (LC) funds work and one major weakness in this approach to investing. The remainder of the article discusses an alternative approach to creating life cycle funds with an example and conclusions at the end of the article.

Today’s life cycle (LC) funds are characterized by an initially high equity proportion that gradually declines through the life of the fund. The idea is that individuals expose themselves to a riskier asset class such as equities in the earlier years of their careers in hope of capturing large returns. In later years, the assets are moved to a safer asset class such as bonds to lower portfolio risk as retirement nears. With this strategy early equity gains are protected against potential later equity declines. This is fine if equity gains are higher than average early on in the life of the fund.

But, what if equity does poorly early and well later? It’s clear that the return of an LC fund depends upon the sequence of annual equity returns. In fact, one’s total portfolio value at retirement depends not only on the total returns over the investment period but also on the order in which the individual years’ returns occur. Even investors who live through a good period for equities may experience poor total returns if equities perform poorly early on relative to their total-period return. Exposing oneself to this return-path dependence is costly because the market provides no extra reward for taking this risk.

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The potentially good news is that next-generation LC funds can be designed to remove annual return-path dependency while preserving the equity participation with protection objective of the current generation of LC funds.

Accepting the “no free lunch” dictum of investing, these next-generation LC funds can’t offer higher return in every equity market outcome, but they can eliminate or minimize path-dependence, protect against loss, and offer high expected return. Such next-generation LC funds would do less well under certain equity outcomes. This under-performance region can be designed to fit the preference of the investor. We believe this would provide many investors with a “preferred lunch” rather than a “free lunch.”

For example, many investors may prefer to maximize their expected retirement funds while at the same time assuring at least a minimum level of assets for retirement. In exchange, they would accept a lesser return when the equity market produces “average” returns over the investment horizon. This particular preference could be implemented using a bond-plus-call (B+C) LC strategy. The bonds held throughout one’s lifetime provide the minimum pool of assets for retirement while the call option provides exposure to high returns when equity markets perform well.

Different investor preferences for both the expected and minimum
asset values at retirement can be implemented by modifying the characteristics of the bond and the call option in the B+C portfolio.

Next we illustrate the return outcome from following representative current LC strategy and a next-generation B+C LC strategy.

**Example Results for Various LC Strategies**

Figures 1 and 2 illustrate the returns realized by following two asset allocation strategies for two representative 10-year equity return sequences. The asset allocation strategies have roughly the same risk; a more detailed examination of risk than presented here requires discussion about the probability distribution of equity returns, which is beyond the scope of this article. This detailed risk examination may be the subject of a subsequent article.

One 10-year equity return sequence is 20, 18, 16, 14, 12, 10, 8, 6, 4, and 2 percent per year; the second returns sequence is the same as the first except that the annual returns sequence is reversed. In both sequences, the average equity return is 11 percent. The bond return is 5 percent per year.

**Current LC Fund**

Figure 1 shows the growth of $1 invested in a representative current LC fund. The fund begins with a 100-percent equity allocation; each year the equity allocation is reduced by 10 percent. The 10th year begins with a 10-percent equity and 90-percent bond allocation.

The upper path on figure 1 shows the fund growth when the equity returns sequence starts with a 20-percent return and each subsequent year has a 2-percent lesser return. The lower path is for the reverse equity returns sequence.

The LC fund in the first sequence grows to $2.55. In the reverse sequence, it grows to only $1.90. Therefore this person would have almost 35 percent less in assets at retirement if equities follow the lower return path even though both paths have the same total equity return. These results can be compared with an all-equity portfolio that would have grown to $2.80, an all-bond portfolio that would have grown to $1.63, and a 50-50 portfolio that would have grown to $2.22.

Unlike an endowment fund or a corporate retirement fund, the individual investor has only one investment period. Asset growth to $2.55 is a lot better than to $1.90, an amount only slightly better than all bonds. Should individuals be taking this path risk? The example below illustrates that an individual can continue to participate in upside equity performance and does not need to take this uncompensated path risk.

**A Bond-Plus-Call LC Fund**

Figure 2 shows the growth of $1 for a representative bond-plus-call LC fund. Approximately 60 percent of this dollar is placed in a 10-year zero-coupon bond while the
remaining 40 percent is invested in a 10-year call option. The call option is priced at an implied annual volatility of 15 percent. Its strike price is 1. (If equities had zero or negative capital gains over the 10 years, the B+C fund’s worst result is $1; that is, no gain and no loss.) In the example here, equities have an average annual total return of 11 percent per annum.

The most striking observation from figure 2 is the fact that the ending value of the B+C LC fund is the same for both equity return sequences: Its final value is path independent. Its final value of $2.68 is only slightly better than the best result from the LC fund ($2.55), but its result is much better than the LC fund’s worst result ($1.90).

Figure 3 combines the results shown in figures 1 and 2.

**Summary**

1. Today’s LC fund returns are path dependent, and this is undesirable.
   - They do well when equity returns are relatively higher in the early years of the investment period.
   - They do poorly when equity returns are relatively lower in the earlier years of the investment period.

2. B+C LC fund returns are path independent, and this is desirable.
3. B+C LC funds represent a next-generation LC fund.
4. There is no free lunch in investing. B+C LC funds offer a higher expected return for equivalent downside risk than current LC funds, but they will underperform current LC funds in “average” markets.

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