Ibbotson Associates Research Paper

Lifetime Asset Allocations: Methodologies for Target Maturity Funds (Summary)

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ibbotson

a Morningstar company

A plan participant's asset allocation is the most important determinant when assessing return. More than 90% of the variability of returns associated with a portfolio is determined not by buying and selling securities or trying to time the market, but through the power of asset allocation.[1] The appropriate asset allocation for a plan participant is determined by their return objectives, risk tolerance, and investment constraints. This information is integrated with long-run capital market expectations to determine the appropriate asset allocation. However, many participants struggle to determine their appropriate asset allocation because they have a hard time defining their risk tolerance.

With the passing of the Pension Protection Act of 2006, plan sponsors were allowed for the first time, with protection from the law, to automate participant involvement and provide qualified default investment options to plan participants in their defined contribution plans. The law designated three Qualified Default Investment Alternatives (QDIAs) suitable for plan participants; they include: target date asset allocation portfolios, balanced funds, and managed account services. Target maturity retirement strategies are rapidly growing as the popular QDIA investment option among plans and plan participants because they are modified to various age groups, easy to understand, and simple to establish and monitor. By 2015, it is projected by FRC in their "LifeCycle Funds Report" that target maturity funds will make up over one-third of the total defined contribution assets[2]

With the provisions established with PPA, plan sponsors can now increase participant retirement savings and help improve participant investment decisions without exposing themselves to unnecessary risks. The question plan sponsors now need to address the issue of what default investment option is appropriate for their plan participants.

That's where a company's plan lineup plays a vital role. By offering plan participants target maturity funds that meet their risk tolerance and in turn, support their asset allocation, a plan provider creates a comfortable, easy, and non-threatening investment environment.

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[1] Ibbotson, Roger G. and Paul D. Kaplan, "Does Asset Allocation Policy Explain 40 Percent, 90 Percent or 100 Percent of Performance?", Financial Analysts Journal, January/February 2000.

[2] FRC LifeCycle Funds Report, 2008.

Benefits of Custom Target Maturity Funds

Given the popularity and importance of target maturity funds, plan sponsors are turning their attention to how they can create and provide the strongest lineups for their participants. Ibbotson's three C's of our custom target maturity solution benefit your plan and ultimately you participants.

- *Control over investment options*
  As a plan sponsor we know you put a great deal of consideration into selecting best in class funds across multiple money managers. Ibbotson constructs target maturity portfolios based on your existing investment lineup, allowing you to maintain control over the investment options and change them when needed.

- *Customization based on specific criteria*
  Ibbotson designs target maturity portfolios tailored to your employees' demographics. We will build a new custom glide path based on a number of criteria including the availability of a defined benefit plan, average savings rate, average account balance, and employment stability. As time passes and the demographics change, Ibbotson will adjust the glide path accordingly.

- *Cost savings by leveraging asset size*
  Building custom target maturity portfolios from the existing investment lineup can allow you as a plan sponsor to leverage favorable fee structures by driving assets to your current institutionally-priced investment options.

As an independent third-party, Ibbotson creates unbiased portfolios that meet strategic plan objectives. To develop these portfolios, Ibbotson relies on and is supported by over 30 years of research on asset allocation, investing, and human capital. Numerous published works can be found on ibbotson.com.

Ibbotson Methodology

The Ibbotson Target Maturity Methodology embraces the latest academic research regarding the role of human capital, the application of liability-driven investing techniques to retirees, advanced optimization techniques, alternative asset class research, and more than 30 years of asset allocation thought leadership. The result is a methodology that can be used to create custom lifetime asset allocation solutions for individuals or specific demographic groups, such as employees from a specific company.

The creation of robust lifetime asset allocation solutions begins with an analysis of the changing risks investors face throughout their lifetimes. During the accumulation phase, investors are primarily concerned with expense risk, savings risk, mortality risk, and market risk. During the decumulation phase, or retirement phase, the primary risks are expense risk, longevity risk, bequest risk, and market risk. Just as the nature and magnitude of these risks evolve over time, so do the methods for controlling them. The changing nature of these risks is closely related to the size of the investor's financial and human capital.

Although competing firms race to release target maturity solutions, most target maturity equity glide paths lack theoretical substance. The Ibbotson approach, however, embraces the work of Harry Markowitz and Bill Sharpe, which tells us that the single portfolio with the best risk and return trade-off is the unobservable market portfolio. Correspondingly, we have created a robust working version of the market portfolio that includes financial assets as well as the largest and most important non-tradable asset: human capital. Both the hypothetical market portfolio and the total economic worth of individuals consist of a combination of financial capital and human capital. The high level stock-bond split of the market portfolio serves as the target portfolio for an individual's total economic worth. For younger investors, human capital is typically their largest asset. As investors age, their human capital is converted into financial capital, and eventually the value of their financial capital exceeds their human capital's value. Because human capital is more bond-like than stock-like, younger investors should invest mostly in equities. As human capital is depleted, the asset allocation of financial capital approaches the market portfolio's target asset allocation.

Ibbotson's Target Maturity Methodology builds upon a holistic framework incorporating the major risks that plan participants may face throughout their lifetimes. These concepts are supported in Ibbotson's research on integrating human capital into the asset allocation decision in the award-winning study, "Human Capital, Asset Allocation, and Life Insurance," developed and written by Peng Chen, Roger Ibbotson, Moshe Milevsky, and Kevin X. Zhu (2006, 2007).

In order to integrate human capital into the asset allocation decision one must better understand the role of human capital in both the market portfolio and individual investor portfolio, as well as, the systematic (or market-like) characteristics of human capital. Human capital affects all four of the primary accumulation phase risks that investors face: Bankruptcy/Liquidity Risk, Savings Risk, Mortality Risk, and Market Risk. Human capital plays an important role in the unobservable, all-inclusive market portfolio of modern portfolio theory and at the individual investor level. When determining an appropriate target asset allocation for an individual investor, the risk a person can afford depends not only on their attitude or preference regarding risk, but also on their risk capacity as dictated by their overall financial situation.

Just as the market portfolio includes an allocation to human capital, so do the portfolios of individual investors. For an individual investor, their overall financial situation is influenced from the same two sources that make up the bulk of the market portfolio: 1) Financial Capital (or tradable assets) and 2) Human Capital (non-tradable assets). There is growing recognition amongst practitioners and academics that the return, risk, and correlation characteristics of human capital should be taken into account when building target asset allocations for investors. For example, sociologist Robert K. Merton points out the

importance of including the *size* of human capital, its volatility, and its correlation with the other assets into the asset allocation decision.

Human capital is a precious and valuable asset that helps investors overcome many of the primary risks that they face, but unlike financial assets for which monthly bank and brokerage statements identify their total value, weekly or monthly pay checks do not identify the total value of human capital, rather they identify the *rate* at which working income is earned. Because the value of human capital is unobservable, its value must be estimated. A basic tenant of finance is that the current value of any asset is the present value of the discounted cash flows the asset will generate. Applying this asset valuation principle while accounting for Mortality Risk (the risk that the individual will die), an individual's total human capital is the present value of their future working income.

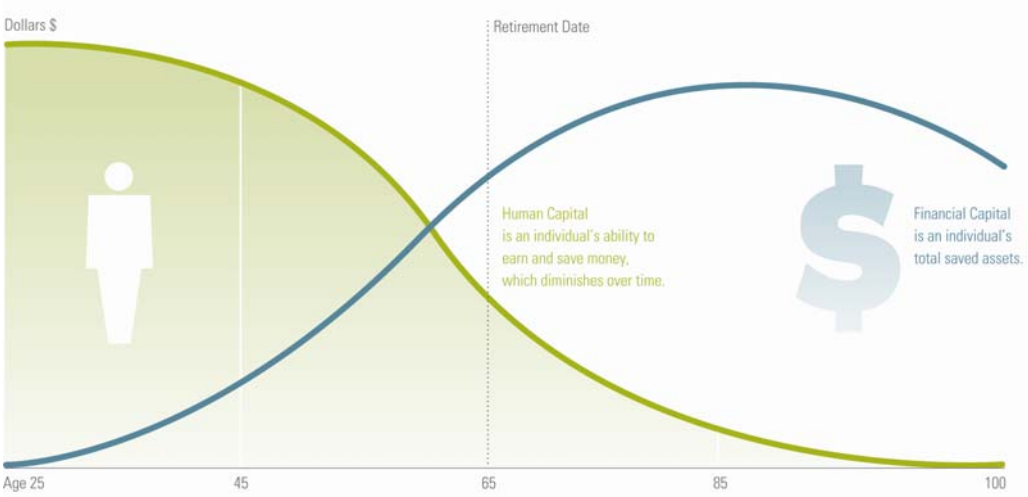
During the accumulation phase, the present value of earnings to be used for pre-retirement expenses cancels (or hedges) the present value of pre-retirement expenses. It is anticipated that salaries exceed expenses allowing investors to save a reasonable portion of their working income for retirement expenses. However, because these two balance sheet entries cancel each other out, they often are omitted from the discussion. For example, when calculating the value of an individual's human capital for making the asset allocation decision, it is common to exclude the present value of earnings used for pre-retirement expenses from the equation, while focusing primarily on the present value of earnings directed toward savings and the present value of earning directed toward Social Security and Pensions.

The market or systematic characteristics of human capital is different for every individual. Tenured university professors with steady salaries that increase on an annual basis based on inflation with little chance of dramatic changes or interruptions have labor incomes that are very bond-like. This type of stable labor income typically has a low correlation with equity markets. In contrast, hedge fund managers or investment bankers have salaries that vary substantially from year to year and are typically highly correlated with the equity markets. Moving to a more common example, the typical investor has human capital that is somewhere in between these two extremes. The human capital of a typical investor is often described as junk bond. During "normal" times junk bonds trade more like bonds, but during times of economic turmoil junk bonds trade more like equities. Overall, Ibbotson estimates that the typical investor's human capital is more bond-like than stock-like. Thus, younger investors with large amounts of human capital have a large (often too large) untradeable asset allocation to a bond-like asset.

Having identified Human Capital as a mostly bond-like asset that plays a critical role in the market portfolio, Ibbotson must attempt to quantify the role of human capital in the market portfolio, ultimately building a working version of the market portfolio that includes human capital. This can be done using specific data about your employee population to create individualized solutions.

Having identified the role of human capital in the market portfolio, Ibbotson analyzes the changing role of human capital in individual portfolios. Figure A illustrates the evolution of the relative size of a typical individual's human capital and financial capital across an individual's lifecycle.

Figure A: Typical Lifecycle of Human Capital and Financial Capital



In addition to Human Capital Ibbotson also incorporates Liability Driven Investing into the custom glide path. For individuals, assets exist primarily to pay for their retirement income liability. As a result, the retirement income liability affects asset allocation policy throughout the investor's lifetime. Yet many asset allocations are based on an asset-only optimization framework, which focuses solely on a subset of the investor's portfolio. Acknowledging the retirement income liability's importance establishes a glide path that incorporates evolving intra-stock and intra-bond allocations. This liability-relative optimization framework focuses on the investor's total financial health. During the accumulation phase, human capital pays for current expenses and provides the investor with inflation protection. As financial capital supersedes human capital, however, asset allocations need to evolve.

Overall, as investors age, asset allocations should have a more pronounced home country bias. This pertains to both intra-stock and intra-bond allocations. Additionally, real return asset classes, such as TIPS, commodities, and real estate, should play an increasing role as human capital provides less and less inflation protection. Finally, intra-bond allocations should gradually shift from high-return, long-duration, nominal-bond-oriented asset allocations towards a less volatile, shorter-duration, real-return-oriented asset allocation.

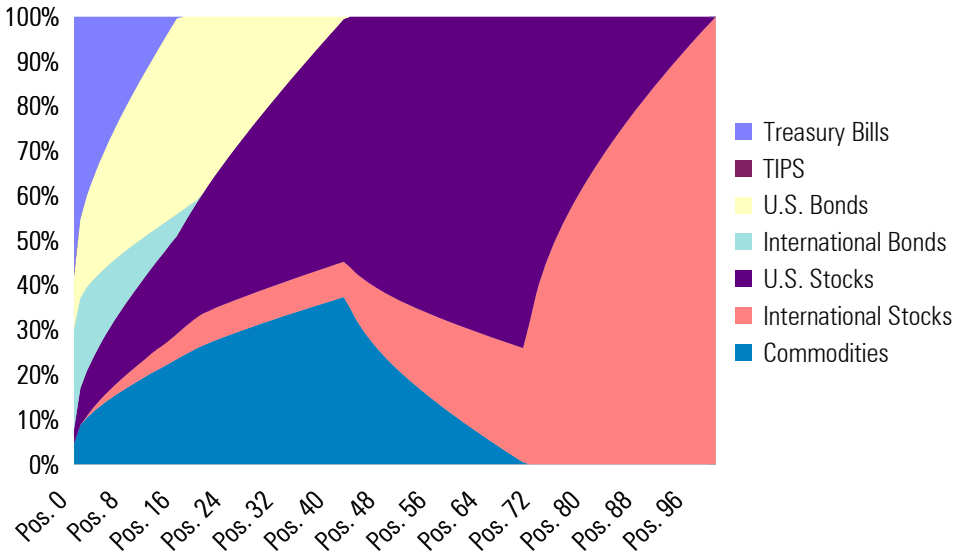
During retirement, controlling the market risk of an investor's overall portfolio remains critical. During the accumulation phase, we emphasized the importance of capturing the size and market-like characteristics of the investor's total portfolio –a portfolio that included financial capital and human capital. As an investor approaches retirement, another part of the investor's total portfolio becomes more relevant: the investor's retirement income liability. The relationship of the retirement income liability to financial and human capital drives the detailed asset allocations decision's evolution during retirement.

Liability-relative optimization is an extension of the traditional Markowitz asset-only approach to determining an optimal asset allocation. In liability-relative optimization, the mean-variance optimizer is constrained to hold an asset class (or combination of asset classes) representing the liability short. Liabilities are typically modeled as a combination of TIPS, long-term nominal bonds, and perhaps a small allocation to equities or real estate. The liability model attempts to capture the liabilities' systematic risk characteristics.[3]

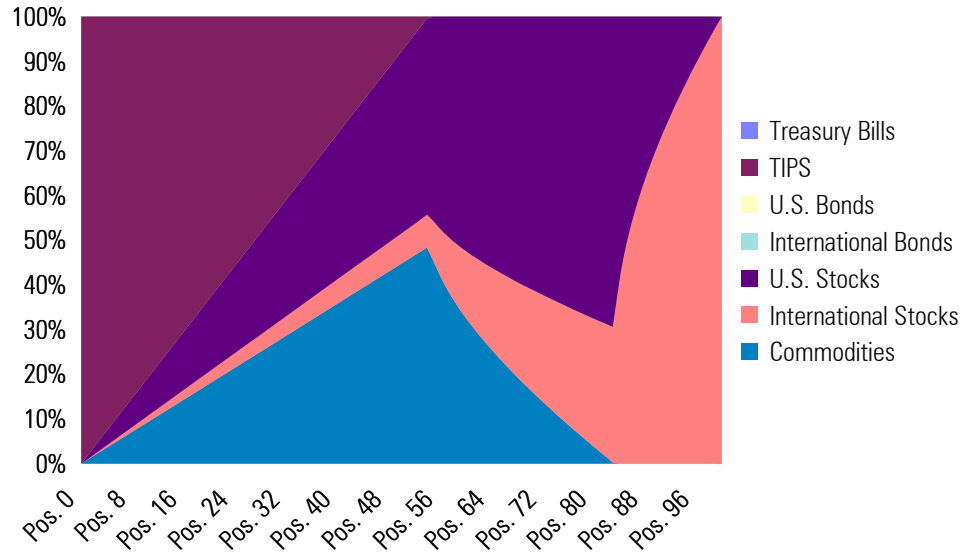
We can see the differences between liability-relative optimization and traditional asset-only approach when using the efficient frontier asset allocation area graph. Efficient frontier area graphs display the efficient frontier's asset allocations across the entire risk spectrum. Conceptually, the efficient frontier area graph is similar to a standard asset allocation pie chart that shows the asset allocation that corresponds to a particular spot on the efficient frontier. The difference is that while the standard asset allocation pie chart shows one asset allocation, the efficient frontier area graph displays all of the asset allocations on the efficient frontier. In Figure B below, the asset allocations from the asset-only optimization are presented in the top panel (Panel A), while the asset allocations from the liability-relative optimization are in the bottom panel (Panel B).

[3] In other words, these other asset classes are treated as explanatory factors that represent the systematic exposure of the investor's retirement income liability.

Panel A – Asset-Only Optimization Based Asset Allocations



Panel B – Liability-Relative Optimization Based Asset Allocations



Panels A and B contain unconstrained optimization-based asset allocations based on a reasonable set of capital market assumptions. These results are for illustration purposes only and are not recommended asset allocations.

A In Figure B, the vertical cross-section at the point labeled "Pos. 0" represents the allocations of the minimum risk asset allocation while the vertical cross-section at the point labeled "Pos. 100" represents the allocations of the maximum return asset allocation.

The asset allocation area graphs contain a wealth of information. In Table 1, we examine the two allocation sets in detail. For each of the asset allocation sets, we identified eight mixes, starting with a 20% stock / 80% bond mix and finishing with a 90% stock / 10% bond mix. For the purpose of identifying the high-level stock-bond split, U.S. large growth, U.S. large value, U.S. small growth, U.S. small value, real estate, non-U.S. developed equity, and emerging markets were classified as stocks. Cash, TIPS, U.S. bonds, non-U.S. bonds, and high-yield were classified as bonds.

Table 1 identifies the percentage of the total assets that are invested in the two real return asset classes: TIPS and real estate.

Table 1: Percentage of Total Assets Allocated to TIPS and Real Estate

Asset Mix	Asset-Only Optimization	Liability-Relative Optimization
20% Stocks / 80% Bonds	12%	60%
30% Stocks / 70% Bonds	14%	46%
40% Stocks / 60% Bonds	16%	38%
50% Stocks / 50% Bonds	15%	29%
60% Stocks / 40% Bonds	14%	20%
70% Stocks / 30% Bonds	11%	13%
80% Stocks / 20% Bonds	8%	8%
90% Stocks / 10% Bonds	4%	5%

Relative to the asset-only optimization, the liability-relative optimization tilts the composition of the asset allocation mixes toward the real return asset classes of TIPS and real estate for the portfolios that are near retirement. As the stock-bond split becomes more equity-centric, the allocations to the real return asset classes decrease.

Table 2 identifies the percentage of the total equity asset allocation that is invested in the two non-U.S. equity asset classes: non-U.S. developed equity and emerging markets. In all of these examples, real estate was classified as stock for the purpose of identifying the stock-bond split; in Table 2, real estate was not included in the analysis.

Table 2: Percentage of Total Equity Allocated to Non-U.S. Developed Equity and Emerging Markets

Asset Mix	Asset-Only Optimization	Liability-Relative Optimization
20% Stocks / 80% Bonds	46%	0%
30% Stocks / 70% Bonds	45%	25%
40% Stocks / 60% Bonds	43%	28%
50% Stocks / 50% Bonds	42%	29%
60% Stocks / 40% Bonds	42%	32%
70% Stocks / 30% Bonds	43%	35%
80% Stocks / 20% Bonds	45%	41%
90% Stocks / 10% Bonds	52%	54%

In this example, liability-relative optimization tilts the composition of the asset allocation mixes away from the two non-U.S. equity asset classes (non-U.S. developed equity and emerging markets) relative to asset-only optimization. Using liability-relative optimization, the allocations to the two non-U.S. equity asset classes increases as the stock-bond split becomes more equity-centric. In contrast when asset-only optimization is used, the allocations to the two non-U.S. equity asset classes stayed in a relatively tight range (42% to 52%) across the stock-bond splits.

Table 3 identifies the percentage of the total fixed-income asset allocation that is invested in non-U.S. bonds.

Table 3: Percentage of Total Fixed Income Allocated to Non-U.S. Bonds

Asset Mix	Asset-Only Optimization	Liability-Relative Optimization
20% Stocks / 80% Bonds	11%	0%
30% Stocks / 70% Bonds	18%	16%
40% Stocks / 60% Bonds	26%	30%
50% Stocks / 50% Bonds	33%	33%
60% Stocks / 40% Bonds	40%	42%
70% Stocks / 30% Bonds	47%	48%
80% Stocks / 20% Bonds	53%	53%
90% Stocks / 10% Bonds	54%	52%

Relative to asset-only optimization the liability-relative optimization tilts the composition of the asset allocation mixes away from non-U.S. bonds in the 20% stocks and 80% bonds asset allocation mix. In the more aggressive stock-bond splits, the allocations did not differ significantly.

The Ibbotson Target Maturity Methodology is a multifaceted approach that embraces the latest academic research and combines it with a sophisticated understanding of human capital's role in asset allocation, application of liability-driven investing techniques to retirees, advanced optimization techniques, alternative asset class research, and 30 years of asset allocation thought leadership. The result is a methodology that can be used to create custom lifetime asset allocation solutions for individuals and groups.

About Ibbotson

Ibbotson Associates is a leading independent provider of asset allocation, manager selection, and portfolio construction services. The company leverages its innovative academic research to create customized investment advisory solutions that help investors meet their goals. Founded by Professor Roger Ibbotson in 1977, Ibbotson Associates is a registered investment advisor and a wholly owned subsidiary of Morningstar, Inc.

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