Financial Planning Implications of the American Taxpayer Relief Act
Michael E. Kitces, Pinnacle Advisory Group

How Much Is Your 401(k) Worth?
David Blanchett, Morningstar Investment Management

A Macro-View of the New Definition of Fiduciary Under ERISA Proposed Sec. 3(21)
Richard D. Landsberg
Director – Advanced Consulting Group, Nationwide Financial Services

Direct Investing in Bonds during Retirement
Stephen J. Huxley, University of San Francisco
Manuel Tarrazo, University of San Francisco

A Digital Asset Balance Sheet: A New Tool for Financial Planners
John E. Grable, University of Georgia
Nolan D. McClure, University of Georgia
Kimberly Broddie, University of Georgia
Stefen Kutzman, University of Georgia
Brad Watkins, University of Georgia
How much is your 401(k) or IRA worth? Like many questions, the answer is it depends. In this paper we discuss three different methods that can be used to estimate the relative value of a tax-advantaged account within a financial planning context (or the “effective” value): the Balance approach, the Tax-Adjusted approach, and Benefit Equivalent approach. The Balance approach is based simply on the value of the account and the Tax-Adjusted approach adjusts this value to take taxes into account. The Benefit Equivalent approach determines the value of the 401(k) or IRA relative to the amount of income it can generate over the lifetime of the account when compared to a taxable account. This is the most complex approach, but potentially the most viable within a financial planning context.

While each of the three different approaches provides a different insight into the effective value of a 401(k) or IRA, the Benefit Equivalent approach may be the most relevant for investors who are using these tax-advantaged accounts for their intended purpose: to create income during retirement. Through simulations, we found that for a 401(k) the Benefit Equivalent effective value of a stock portfolio may be worth approximately 100% of a taxable account and approximately 110% of a taxable account for bonds. For a Roth IRA we found that the Benefit Equivalent effective value of a stock portfolio may be worth approximately 130% of a taxable account and approximately 140% of a taxable account for bonds.

The author thanks Alexa Auerbach and Bill Reichenstein for helpful edits and comments.
Introduction

How much is your 401(k) or IRA worth? This is an important question that has implications in a variety of financial planning contexts, such as determining a client’s net worth or achieving a target asset allocation across different account types. In this paper we discuss three different methods that can be used to estimate the relative value of a tax-advantaged account within a financial planning context (or the “effective” value): the Balance approach, the Tax-Adjusted approach, and the Benefit Equivalent approach.

Under the Balance approach the effective value of the 401(k) or IRA is just the unadjusted value of the account (i.e., the balance). Under the Tax-Adjusted approach the effective value is determined by taking into account some type of tax adjustment (generally a discount). The Benefit Equivalent approach determines the balance in a taxable account required to create the same amount of lifetime income as a tax-advantaged account (e.g., 401(k) or IRA) in question. The Benefit Equivalent approach is the most complex of the three, but is potentially the most useful when determining the relative value of different accounts in a financial planning context, especially as it relates to achieving a retirement income goal for a retiree.

We find that the effective value of an 401(k) or IRA can vary materially based on account type (Traditional versus Roth) as well as other factors such as the lengths of the accumulation and distribution periods, tax rates, and how the portfolio is going to be invested. Using a Tax-Adjusted approach (with a liquidation focus) the value of a Traditional IRA or 401(k) might only be worth half its existing balance,
while using a Benefit Equivalent approach the value of a Roth 401(k) or IRA invested in bonds could be worth double its existing balance.

**Literature Review**

Horan (2007) provides a relatively thorough literature review on the topic of valuing different account types. Correctly framing the value of different accounts is an important exercise, since account types with different tax benefits are not going to be economically equivalent. The majority of research on the topic focuses on two main themes: determining the overall value of the account, and the value to use within any type of portfolio optimization.

Sibley (2002) develops a model to calculate taxable equivalent values (TEVs) that make balances in non-taxable accounts comparable with taxable accounts. This is very similar to the “Benefit Equivalent” approach used for this paper. Sibley uses a model, however, that assumes the account is liquidated as a single cash flow at some future time, which is inconsistent with how these accounts tend to be used by retirees. Horan (2002) expands Sibley’s approach to include annuitized cash flows and a broader array of taxation schemes, where returns can be attributed as ordinary or capital gains, as well as realized and unrealized.

Reichenstein (2007) contends that the after-tax values (ATVs) must be used when assessing portfolio risk and asset allocation, which is the Tax-Adjusted model within the framework of this paper. This is based on a “risk-sharing” model, where the government, by taxing annual returns or terminal withdrawals, shares investment risk as well as investment returns with the account holder (and is therefore a
part owner in the account). Reichenstein (2007) derives the value of a tax-deferred investment based on the premise that investors bear all the investment risk and contends that Sibley’s and Horan’s taxable equivalent models are wrong because the discount rate in their models does not reflect the fact that investors bear all the risk of investment returns in TDAs and Roth IRAs.

Reichenstein’s model implies an investor would be indifferent between a taxable account and a Roth IRA. This is despite the fact that a Roth IRA has a greater relative value, especially over longer time periods and when investing in relatively inefficient portfolios due to its entirely tax-free status, while future taxes will be due on gains in the taxable account. Dammon, Spatt, and Zhang (2004) characterize this concept best when they note that wealth in the tax-deferred account is more valuable than wealth in the taxable account because of the ability of the tax-deferred account to earn pre-tax returns.

Defining Value

Valuing a 401(k) or IRA initially does not seem like a difficult exercise. Unlike assets such as paintings, homes, or cars, 401(k)s and IRAs are typically expressed as some dollar value (e.g., your IRA is worth $62,549.23). Using this dollar value to define the value of the account is an approach we call the “Balance” method. This is the most common technique used to value IRAs and 401(k)s within a financial planning context. This simplistic approach, though, overlooks some important differences in the different types of accounts. For
example, a 401(k) (or Traditional IRA) is an account that has not yet been subject to taxes, while the owner of a Roth 401(k) has already paid tax on the contributions. Therefore it stands to reason that a Roth IRA should be worth more than a Traditional 401(k).

The second approach we use to define the value of a tax-advantaged account is the Tax-Adjusted approach. Under this approach the balance is adjusted to incorporate taxes. For example, if an investor owns a 401(k) worth $100,000, assuming a 25% tax rate, the effective value of the account would be $75,000 ($100,000 * (1 - 25%) = $75,000). Reichenstein, Horan, and Jennings (2012) use a Tax-Adjusted approach and give an example of an investor (Janet) who has $1 million in a tax-deferred account in bonds and $1 million in a tax-exempt account in stocks and that in retirement she will be in the 28% tax bracket. They noted that while she currently has 50% allocated to stocks and 50% allocated to bonds, her tax-deferred account is only worth $720,000 after taxes, thereby changing the effective asset allocation to 58% stocks and 42% bonds.

There are a number of different tax rates that could be used in the Tax-Adjusted approach: a liquidation tax rate, a current marginal tax rate, a retirement tax rate, or combinations of the three. The liquidation tax rate would be the total tax paid if the account were liquidated. This is likely going to imply largest potential reduction from the unadjusted value, since it would be based on the marginal tax rates at the federal, state, and local level and would also (potentially) include the 72(t) 10% distribution penalty tax for nonqualified

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1 In the context of this analysis these terms can generally be used interchangeably but 401(k) will be the term used going forward to minimize redundancy

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distributions and could exceed 50% for some investors. The current tax rate would just be the current tax rate that would apply to the monies, ignoring any potential penalties.

The retirement tax rate is the tax rate that the investor expects to pay on the monies when they are distributed during retirement. Estimating future tax rates, however, is a difficult exercise especially since an investor would need to forecast future tax rates. While tax-advantaged accounts benefit investors by allowing all potential gains (in a Traditional IRA) to be deferred until distributions, the potential benefit can be greatly reduced if the future tax rate exceeds the tax rate at the time the contributions are made. Gokhale and Kotlikoff (2003) note that some investors will likely end up being taxed at a lower tax rate than they would have paid to make the tax-advantaged contribution, limiting the potential value of the account.

The Benefit Equivalent approach recognizes that tax-advantaged accounts convey additional tax benefits for the holder that should be considered when determining the relative value of the account. The key concept behind the Benefit Equivalent approach is that the lifespan of a tax-advantaged account could exceed 60 years for some investors (e.g., for someone who is 25 years old) and therefore the potential benefits of a tax-advantaged account would be realized over an extended period.

**Benefit Equivalence**

The Balance and Tax-Adjusted approaches are absolute measures of the effective value of a 401(k), not relative measures, since they assign a value to the account in isolation. While these approaches offer a simple way to determine the
effective value, they are incomplete since they do not consider the relative ability of these accounts to create retirement income when compared to a tax-advantaged account. Investors save money to achieve a goal, for example retirement, therefore the relative value of an account should be determined using a framework describing how the account helps that investor achieve his or her goal.

The Benefit Equivalent approach determines the value a 401(k) would need to have in order to create the same level of benefits as a taxable account. For example, assume you start out with $100,000 in a 401(k) with an annual rate of return of 5%. There are no cash flows during the first five years, but an annual $28,075 withdrawal starting at year six. At the end of year 10 the account is depleted. If we assume a 25% tax rate, the $28,075 withdrawal would result in a $21,056 after-tax withdrawal. This is shown in Panel A of Table 1.

**Table 1: Benefit Equivalence**

**Panel A: 401 (k)**

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In order to determine the effective value of the 401(k) to a taxable account for this investor (or really this scenario) we need to determine the value of the taxable account that would yield the same after-tax cash flow of $21,056 in years six through 10. We will assume that the taxable account has a basis equal to its initial value and that the entire 5% annual return (gain) is realized each year (i.e., the account is invested in bonds) and that all gains are taxed at 25%. If we “solve” for the initial balance, we determine the taxable account would need an initial balance of $78,530 to create the same amount of after-tax income as the 401(k). This is shown in Panel B of Table 1.

For this scenario we determined that a $100,000 401(k) balance creates an equivalent amount of benefits as a $78,530 taxable account balance. Therefore, the $100,000 401(k) is only worth 78.5% of the $100,000 taxable account from a Benefit Equivalent perspective, i.e., 21.5% less, since the taxable account is able to produce the same income with a lower initial balance. While it should not surprise the reader that the 401(k) is worth less than the taxable account, it is
important to note that the 21.5% reduction is less than the assumed tax rate of 25%. This is because the 401(k) is more tax efficient than the taxable account, and this tax efficiency increases the effective value of the 401(k).

**The Tax Efficiency Spectrum**

In the previous section we explored a simple example, but the relative value of a 401(k) account is going to depend on a variety of factors, such as the relative tax rates, the length of the investing period, and the tax efficiency of the respective investments.

The relative tax efficiency of investments can be thought of in terms of a spectrum. The least efficient investments from a tax perspective are investments where all gains are realized each year and where the realized gains are taxed at ordinary income tax rates. For the purpose of this section we will call these investments “bonds” since bonds tend to have these attributes, especially if you were to purchase a bond directly from an issuer.

On the opposite end of the tax-efficiency spectrum would be an investment where gains are only realized when money is withdrawn from the account and all gains are taxed at capital gains rates. This type of growth and taxation would be possible for an individual stock that pays no dividends. We will therefore call these investments “stocks” for this section.

While holding stocks can be more tax efficient than holding bonds, this is not always the case. The relative efficiency of holding stocks can vary at a much greater level than holding bonds based on the types of stocks held and turnover. A mutual fund manager who frequently trades the
portfolio, thereby causing the mutual fund shareholders to realize gains regularly, can dramatically reduce the relative efficiency of holding stocks. At the extreme, if a portfolio manager causes an investor to realize all gains in a given year based on securities that are held for less than a year, holding stocks could be even more inefficient than holding bonds if the returns exceed those of bonds. This concept will be explored in greater detail in the next section.

For now, let us assume that bonds are perfectly inefficient tax investments and stocks are perfectly efficient tax investments. This means the returns on bonds are realized every year and taxed at ordinary income tax rates while the gains for stocks are only realized when the stock is sold to generate income (during retirement). We assume that the annual return on bonds is 4.0%, the annual return on stocks is 8.0%, and inflation is 2.5%. For the analysis we assume that the accounts will grow over a period of time between one to 40 years (the accumulation period), after which distributions will be taken from the account (the retirement period).

The portfolio distribution amount (during retirement) is based on the value of the portfolio when the distribution period starts. The initial distribution amount is simply the percentage return for the account, which is 4.0% for bonds and 8.0% for stocks. The initial withdrawal amount is assumed to increase annually by inflation (2.5%) until the account is depleted. This approach can ensure that the distribution period lasts a reasonable period (between 20 and 25 years) and that the account is exhausted at some point.

We conduct four different simulations, for two different investment types (stocks and bonds) and for two different
account types (401(k)s and Roth IRAs). Within each simulation we vary the ordinary income tax rate and the length of the accumulation period. All gains for the taxable stock account are assumed to be long-term capital gains, which we assume is taxable at the 15% rate. All bond income is taxed at the ordinary income tax rate, which varies by simulation. The basis of the taxable accounts is equal to the initial balance.

For the analysis we test accumulation periods from one to 40 years (in one-year increments) and ordinary income tax rates from 15% to 45% (in 1% increments). An investor with a 40-year accumulation time horizon could be someone currently 25 years old planning to retire when he or she turns 65. While the highest tax rate (45%) is above the highest current top federal ordinary income tax rate (at least at the time this paper is being written), an investor could potentially be taxed at a rate greater than 45% when considering state and local taxes. Tax rates could also increase in the future.

Results

Figure 1 includes the results for the 401(k) analysis for stocks and bonds. As a reminder, the percentage values in Panels A and B are the effective values a 401(k) would need to have in order to create the same level of income as a taxable account. In the first example on Benefit Equivalence (Table 1) the 401(k) was worth 78.5% of the taxable account. We use the same general approach in this section, although we conduct considerably more simulations.

For bonds (Panel A in Figure 1) the relative value of the 401(k) depends a great deal on the length of the accumulation period and the tax rate, where the effective value of the 401(k) ranges from 88% to 173%. The minimum effective value
(88%) is higher than the first example (which had an effective value of 78%) because the total period is longer. The first example had a period of only 10 years (five accumulation years and five distribution years), while even in the one-year accumulation example the total period is 26 years since the retirement period is assumed to last 25 years.

Longer accumulation periods and higher tax rates increase the relative value of the 401(k). As a reminder, the tax rate on the 401(k) distributions is assumed to be the same as the tax rate paid for the realized income from the bond returns, the difference is that the taxable account realizes the gains annually (and pays taxes on them) while the 401(k) only pays taxes when distributions are taken from the account.

The interesting takeaway from Panel A for bonds in 401(k)s is that for investors who have at least 10 years for accumulation, the 401(k) is worth *more* than a taxable account (i.e., has a higher effective value). This is despite the fact that taxes have yet to be paid on the 401(k) and the only gains paid on the taxable account are gains on the returns. For a bond investor with an accumulation period of 10 years (and approximate distribution of 25 years) the simulations show a 401(k) is going to be worth at least as much, if not more, than a taxable account from a Benefit Equivalence perspective. We approximate the effective value at 110% of the taxable account.

The effective value of a 401(k) for stock investors is always less than a taxable account, averaging approximately 85%. This should not surprise the reader, since the perfectly efficient stocks have no realized gains and taxes are only paid at long-term capital gains rates (15%) when the stock is sold to
create income for the retiree. Taxes are also not due on the basis, thereby creating tax-free income for the retiree.

Figure 1: Relative Value of a Traditional 401(k) versus Taxable Account

Panel A: Invested in Bonds

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Panel B: Invested in Stocks

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The next analysis looks at the relative value of a Roth IRA versus a taxable account. Roth IRAs are similar to taxable accounts in that taxes have already been paid on the accounts; therefore, the value of a Roth IRA would likely be the same using a Tax-Adjusted effective value measure. Roth IRAs have an advantage over taxable accounts, though: all future gains are tax free while a taxable account realizes gains annually. This has a material impact on the relative attractiveness of the accounts, especially for a bond investor, as can be noted in Panel A of Figure 2.

Figure 2: Relative Value of a Roth 401(k) versus a Taxable Account

Panel A: Invested in Bonds

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Panel B: Invested in Stocks

<table>
<thead>
<tr>
<th>Ordinary Income Tax Rate</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
<th>35%</th>
<th>40%</th>
<th>45%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulation Period (Years)</td>
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<td>112%</td>
</tr>
</tbody>
</table>

The simulations show the effective value of a Roth IRA is always worth more than a taxable account—considerably more in some scenarios for a bond investor. In Panel A of Figure 2 we see the effective range is between 109% and 250%. The effective value differences are similar to Panel A of Figure 1 (for 401(k)s) but the Roth IRA is worth more (not surprisingly) because the monies are already after tax. For a bond investor with an accumulation period of 10 years (and approximate distribution of 25 years), the simulations show a 401(k) is worth at least as much if not more than a taxable account from a Benefit Equivalence perspective. We approximate the effective value at 140% of the taxable account.

Less Efficient Stocks

The previous analysis made assumptions regarding the relative efficiency of bond and stock investments, where bonds were assumed to be perfectly inefficient and stocks assumed to
be perfectly efficient. Bond investments are almost by
definition going to be perfectly inefficient, since the holder of
the bond will receive the coupon payments and those coupon
payments will be taxed at ordinary income rates. Even if an
investor were to purchase a zero coupon bond (which does not
have coupon payments) tax is due on the imputed interest that
accrues each year. Therefore, assuming bonds are perfectly
inefficient is a reasonable assumption; however, assuming
stocks are perfectly efficient is subject to greater scrutiny.

In order for stocks to be perfectly efficient over a long
time period (e.g., 30 years), an investor would have to purchase
a single individual stock that pays no dividends for the entire
period. It is unlikely many (if any) investors would invest in
this fashion. In reality investors purchase diversified
investment vehicles, such as mutual funds that vary
considerably with respect to tax efficiency. At a minimum
many stocks pay dividends, which reduce their overall tax
efficiency.

One metric that can be used to gauge the relative tax
efficiency of a mutual fund is the turnover rate. The turnover
rate is the percentage of a fund’s holdings that has changed
over a year. The rate is calculated by dividing the lesser of
purchases or sales (excluding those of short-term assets) in a
fund’s portfolio scaled by average net assets. In the 2012
Factbook, the Investment Company Institute (ICI) noted that in
2011 the average asset-weighted annual turnover rate
experienced by equity fund investors was 52%. This was
slightly below the average turnover rate over the past 38 years,
as noted in Figure 3.
The frequency that a mutual fund manager turns over a portfolio has important implications for the after-tax returns achieved by investors. Morningstar, Inc. has a metric called the Tax Cost Ratio that measures how much a fund’s annualized return would be reduced by the taxes investors pay on distributions. This metric provides the user with an indication of how trading activities of the portfolio manager would affect the shareholder’s returns net of taxes. For example, if the portfolio manager is interested in selling a security that has a sizeable gain but has held it for almost a year, he or she could either choose to go ahead and sell the stock (whereby the gain would taxed at ordinary income tax rates because the holding period was less than a year) or hold the stock and sell it to ensure the shareholders would incur long-term capital gains.
In order to determine how the effective value of a Traditional 401(k) and Roth IRA changes for a stock investor some additional simulations are conducted where the relative tax efficiency of the stock (or really stock portfolio) being held varies. The two main variables that are adjusted are the percentage of gains realized in a given year (5%, 25%, 50%, and 100%) and the percentage of gains realized that are long-term capital gains (i.e., taxed at 15% versus the ordinary income tax rate). The most efficient stock simulation would be one where no gains are realized each year (gains are only realized when the stock is sold to fund retirement) and where all gains are long-term capital gains. Changing these variables therefore changes how tax efficient the stock investor actually is with respect to his or her portfolio.

For this analysis we run simulations for 20%, 30%, and 40% ordinary income tax rates and for 5, 15, and 25 year accumulation periods. The results for the 401(k) are included in Table 2 and the results for the Roth IRA are included in Table 3.
Not surprisingly, the simulations show that the effective value (or relative value) of a 401(k) invested in stocks varies significantly across different holding periods, tax rates, and levels of stock tax efficiency. 401(k)s invested in stock are most valuable when all the gains in the stock portfolio are realized every year as ordinary income (i.e., they are perfectly inefficient, like bonds) and are least valuable when ordinary tax rates are highest for very efficient stock investments. The simulations show, however, that the minimum effective value
of a 401(k) invested in stocks was only 82% of the actual value while the maximum effective value was 198%.

If we assume a turnover rate (or % Gain Realization in Figure 2) of 35%, which is the approximate median for equity funds in 2011 according to ICI, and that 75% of the gains realized by stock investors (or really mutual fund investors) are long-term capital gains, the simulations show that a Traditional 401(k) invested in stocks is worth approximately the same (100%) as a taxable account from a Benefit Equivalent perspective.
Table 3: Relative Value of a Roth IRA versus a Taxable Account Invested in Stocks for Various Efficiency Scenarios

Roth IRAs were worth more than taxable accounts for each of the different tax scenarios in Table 3. This is not surprising since while both the taxable account and the Roth IRA are after-tax vehicles, any future gains are taxed in the taxable account while all future gains are tax-free in the Roth IRA account. The minimum effective value was 113% of the taxable account and the maximum value was 275% of the taxable account. If we assume a turnover rate (or % Gain Realization rate) of 35% and that 75% of the gains are long-
term capital gains, the simulations show a Roth IRA invested in stocks is worth approximately 130% as a taxable account from a Benefit Equivalent perspective.

Implications

Up to this point we have noted three different approaches that can be used to estimate the effective value of an IRA or 401(k): the Balance approach, the Tax-Adjusted approach, and Benefit Equivalent approach, focusing primarily on the later. Under the Balance approach a 401(k) or Roth IRA would have the same effective value as a taxable account of the same value. Under the Tax-Adjusted approach the value of the account would vary depending on the assumptions regarding when the distributions would take place and any additional penalties that may be assessed to access the money. For simplicity purposes we will assume the tax rate for the Tax-Adjusted approach is 25%, leading to an effective value of 75% of balance of a 401(k) and an effective value of 100% for a Roth IRA (since Roth monies are already post-tax).

Through these simulations we found that for a 401(k), the Benefit Equivalent effective value of a stock portfolio is worth approximately 100% of a taxable account and approximately 110% of a taxable account for bonds assuming the account is held for at least 20 years in accumulation and 20 years in retirement. For a Roth IRA we found that the Benefit Equivalent effective value of a stock portfolio is worth approximately 130% of a taxable account and approximately 140% of a taxable account for bonds. However, the actual effective value for the Benefit Equivalent approach would differ materially by the tax efficiency of the investor’s portfolio.
Therefore, across the three approaches we have values for 401(k)s that range between 75% to 110% (on the conservative side) and values for Roth IRAs that range between 100% to 140% (on the conservative side). Which is the right number to use for a financial plan? If an investor has at least 15 years until retirement and plans to hold the account until then, the value of the 401(k) is likely worth at least the current nominal balance. However, if an investor has limited taxable holdings and may need to access the 401(k) at some point to fund his or her lifestyle before retirement, a discount is likely in order.

**Conclusion**

How much is your 401(k) or IRA worth? Like many questions, the answer is it depends. In this paper we discussed three different methods that can be used to estimate the relative value of a tax-advantaged account within a financial planning context (or the “effective” value) - the Balance approach, the Tax-Adjusted approach, and Benefit Equivalent approach. The Balance approach is based simply on the value of the account and the Tax-Adjusted approach adjusts this value to take taxes into account. The Benefit Equivalent approach determines the value of the 401(k) or IRA relative to the amount of income it can generate over the lifetime of the account when compared to a taxable account. This is the most complex approach, but potentially the most viable within a financial planning context.

While each of the three different approaches provides a different insight into the effective value of a 401(k) or IRA, the Benefit Equivalent approach may be the most relevant for investors who are using these tax-advantaged accounts for their intended purpose: to create income during retirement. Through simulations we found that for a 401(k), the Benefit Equivalent
effective value of a stock portfolio may be worth approximately 100% of a taxable account and approximately 110% of a taxable account for bonds. For a Roth IRA we found that the Benefit Equivalent effective value of a stock portfolio may be worth approximately 130% of a taxable account and approximately 140% of a taxable account for bonds.

References


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Monte Carlo is an analytical method used to simulate random returns of uncertain variables to obtain a range of possible outcomes. Such probabilistic simulation does not analyze specific security holdings, but instead analyzes the identified asset classes. The simulation generated is not a guarantee or projection of future results, but rather, a tool to identify a range of potential outcomes that could potentially be realized. The Monte Carlo simulation is hypothetical in nature and for illustrative purposes only. Results noted may vary with each use and over time.

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